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bulletin of
Duke University 1985-86

School of Forestry and Environmental Studies



Duke University, Durham, N.C.

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Duke University 1985-86

School of Forestry and Environmental Studies

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University Administration

General Administration

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Administration of the School of Forestry and Environmental Studies

Benjamin A. Jayne, M.F., Ph.D., *Dean of the School of Forestry and Environmental Studies*
William J. Stambaugh, M.S., Ph.D., *Associate Dean for Academic Programs*
Curtis J. Richardson, B.S., Ph.D., *Director of the Integrated Case Studies Program in Natural Resource Analysis*

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Faculty

Leo Alpert,* Ph.D., *Adjunct Professor*; B.S., Massachusetts State College; M.A., Ph.D., Clark University.

Current research interests: assessment of the current state of knowledge of tropical forest meteorology; preparation of a compendium of tropical forest climates; climatic effects of the destruction of the moist tropical forests.

Daniel E. Binkley, Ph.D., *Assistant Professor and Research Associate*, B.S.E., Forest Management, Northern Arizona University; M.S., Forest Ecology, University of British Columbia; Ph.D., Forest Ecology, Oregon State University.

Current research interests: regulation of forest productivity by nutrient cycles, including nitrogen fixation, methods of assessing forest nutritional status, reciprocal effects of vegetation on soils, and effects of stand treatments on nutrient cycling processes.

Stephen G. Boyce,* Ph.D., *Adjunct Professor*; B.S., M.S., Forestry, Ph.D., Plant Ecology, North Carolina State University.

Current research interests: biological potential for timber production in relation to all forest benefits; integration of ecosystem dynamics and silviculture to provide forest benefits in the context of social, economic, and political forces.

Norman L. Christensen, Jr., Ph.D., *Associate Professor*; B.A., M.A., Biology, California State University, Fresno; Ph.D., Biology, University of California, Santa Barbara.

Current research interests: the effects of disturbance on the structure, function, and development of plant populations and communities; in particular, patterns of forest development following cropland abandonment as these are affected by environment, stand history, and patterns of seed rain. Research on the southeastern coastal plain is focused on a comparative study of biogeochemical and community responses to varying fire regimes.

William K. Condrell,* J.D., *Adjunct Professor*; B.S., Industrial Economics, Yale University; S.M., Business and Engineering Administration, Massachusetts Institute of Technology; J.D., Harvard University.

Current research interests: income, estate and gift, and property taxation of timber. In particular, the development of tax systems which maximize timber growth and effective forest utilization from the viewpoint of both the national interest and timber ownerships of all sizes.

William C. Davis, Ph.D., *Assistant Professor*; B.A., Sociology, Knox College; M.F.S., Forestry, Ph.D., Silviculture, Yale University.

Current research interests: silvicultural manipulation of forest stands, development of even-aged mixed stands, and natural regeneration systems. Partial cutting as a means of maximizing stand productivity and economic return. Control or manipulation of hardwoods in old field pine stands and plantations.

Alexander T. Davison,* M.F., *Adjunct Assistant Professor*; B.S., Botany, M.F., Forest Entomology, Duke University.

Current research interests: application of remote-sensing techniques to forest resource management problems; development of appropriate management strategies for private forest landowners; forest insect pest control through forest management techniques.

Richard T. Di Giulio, Ph.D., *Assistant Professor and Research Associate*; B.A., University of Texas; M.S., Wildlife Management, Louisiana State University; Ph.D., Wildlife Biology, Virginia Polytechnic Institute and State University.

Current research interests: integration of ecological and toxicological principles and methodologies in hazard assessment of environmental contaminants. Accumulation and transport phenomena of contaminants in natural systems; impacts of contaminants on biota, particularly vertebrates. Estuarine, wetland, and waterfowl ecology.

George F. Dutrow, Ph.D., *Adjunct Associate Professor*; B.S., General Science, M.F., Wood Technology, Ph.D., Forest Economics, Duke University.

Current research interests: measuring the physical and financial implications to the landowner, region, and nation of silvicultural treatments to increase timber supplies and other products of forest lands. Quantifying and developing the implications of applying or omitting research recommendations for forest management. Estimating net economic results of the evolving technologies of genetically improved or disease resistant planting stock, forest fertilization, and site selection and modification. Evaluating alternative land use programs, management treatments, and policies in terms of economic and physical outputs and trade-offs of services and products from forest lands. Examining methodologies for ascertaining future prices, rates of discount, investment criteria, and distributional effects of various management policies.

*Denotes faculty not in full-time residence at Duke University.

Daniel H. Gelbert,* M.F., *Adjunct Assistant Professor*; B.S., pre-Forestry, M.F., Forest Management, Duke University.

Current research interests: development of management plans for private, nonindustrial ownerships; development of case history and case study approaches to management instruction and research.

William J. Hart,* M.P.A., *Adjunct Professor*; B.S., Forestry, Utah State University; M.P.A., Resource Economics and Administration, Harvard University.

Current research interests: developing regional case studies for teaching and research in the interactions of diverse disciplines, government agencies, and clientele groups that occur in preparing and implementing plans for forests, parks, and water in urban and rural settings. Establishing permanent outdoor laboratories and supporting information programs for the systematic, long-term study of outdoor recreation phenomena, including user behavior, cost-effective management techniques, and natural resource system response.

Milton S. Heath, Jr.,* LL.B., *Adjunct Professor*; A.B., Harvard; LL.B., J.D., Columbia University.

Current research interests: environmental and natural resource law and administration; legislative and other governmental aspects of resource development.

William F. Hyde, Ph.D., *Associate Professor*; A.B., International Relations, American University; M.A., Economics, M.S., Natural Resources, Ph.D., Resource Economics, University of Michigan.

Current research interests: economics and policy aspects of regulation and deregulation in the natural resources based industries; land management, timber supply, and allocation policy for natural resources.

Benjamin A. Jayne, Ph.D., *Professor*; B.S.E., Forestry, University of Idaho; M.F., Forestry, Ph.D., Forestry, Yale University.

Current research interests: management of natural resource systems. In particular, the application of mathematical models, including simulation and optimization techniques, to decision making in the management of renewable resources. The application of physical theory to the transport of mass and energy in terrestrial and aquatic ecosystems including concepts from thermodynamics and fluid mechanics. Development of basic theory for predicting the physical properties of particulate materials such as soils and other composite media.

Kenneth R. Knoerr, Ph.D., *Professor*; B.S.E., Forestry, University of Idaho; M.F., Forestry, Ph.D., Yale University.

Current research interests: development of predictive models for the energy and mass exchange processes and the state of the atmosphere that characterizes the biological environment (the microclimate). These physical models can be interfaced with other biological models to give a better understanding of how biological systems interact with, respond to, and are controlled by their environment. The models can also be used to solve more applied problems such as those concerned with the primary production of forest stands, effects of land management practices on water yield, or the impact of environmental perturbations on the ecosystem. In parallel with the modeling there has been an intensive experimental effort to collect physical environment and biological data to both test and improve the models. Future work will include the development of models for special purposes, such as prediction of characteristics of the microclimate from infrared mapping of the surface radiometric temperature.

Lynn A. Maguire, Ph.D., *Assistant Professor and Research Associate*; A.B., Biology, Harvard University; M.S., Resource Ecology, University of Michigan; Ph.D., Ecology, Utah State University.

Current research interests: application of quantitative methods, including simulation modeling, statistics and decision theory, to ecological aspects of resource management and land use planning. Modeling the ecology of forest production. Forest wildlife; endangered species.

Carlos M. Marin, Ph.D., *Assistant Professor*; B.S., Civil Engineering, M.S., Environmental Science and Engineering, Rice University; S.M., Ph.D., Environmental Science and Engineering, Harvard University.

Current research interests: identification and coupling of statistical and physically based hydrologic models in water resource systems planning and management. Development of techniques for incorporation of parameter and model uncertainty and risk/performance indices in the evaluation of alternative management strategies. Regionalization of spatial information using empirical Bayes methods. Investigation of the temporal dependence structure of hydrologic time series.

Kenneth H. Reckhow, Ph.D., *Assistant Professor*; B.S., Engineering Physics, Cornell University; M.S., Ph.D., Environmental Science and Engineering, Harvard University.

Current research interests: development, application, and evaluation of water quality models, in particular for the management of eutrophication, toxic substances, and acid deposition. Estimation and propagation of uncertainties in models using first order error analysis and Monte Carlo simulation. Decision and risk analysis for water quality management. Applied statistics for the assessment of water quality.

Curtis J. Richardson, Ph.D., *Associate Professor*; B.S., Biology, State University of New York at Cortland; Ph.D., Ecology, University of Tennessee.

Current research interests: ecosystem analysis of wetland and forest systems. Specific research on the linkages between terrestrial and aquatic ecosystems and the effects of large-scale perturbations on such

systems. Studies at the process level include productivity, biogeochemical cycling, and soil chemistry/plant nutrition relationships in wetlands and forest systems. Applied ecology research includes studies on clear-cutting, wastewater applications on ecosystems, reclamation of alkaline soils, and wetlands management.

Jack P. Royer, Ph.D., *Assistant Professor*; B.S., Forestry, Pennsylvania State University; M.S., Public Affairs, American University; Ph.D., Natural Resources, Cornell University.

Current research interests: natural resource policy and administration of forests, land and water resources, and outdoor recreation. Environmental law. Application of resource economics, resource planning, and various analytical methods to formulation of resource policy.

William R. Sizemore,* Ph.D., *Adjunct Professor*; B.S., Forestry, Louisiana State University; M.F., Duke University; Ph.D., Forestry, University of Georgia.

Current research interests: impact of all types of taxes on forest landowners, industrial and nonindustrial. In the field of federal taxation, the combined effects of income and estate taxation are of special interest. Management information systems for forest operations.

William J. Stambaugh, Ph.D., *Professor*; B.S., Forestry, M.S., Forestry, Pennsylvania State University; Ph.D., Forest Pathology, Yale University.

Current research interests: pathology of woody plants Ecology of soil microorganisms with emphasis on mycorrhizae and root diseases of trees. Disease control strategies including biocontrol systems.

Harold Karl Steen,* Ph.D., *Adjunct Professor*; B.S., Forestry; M.F., Ph.D., History of Conservation, University of Washington.

Current research interests: political and economic development of modern forestry concepts and policies; history of conservation and land use as related to current forest land issues.

J. Michael Vasievich, Ph.D., *Adjunct Assistant Professor*; B.A., Biology, Franklin and Marshall College; M.F., Forestry, Ph.D., Forest Economics, Duke University.

Current research interests: investment analysis of forest land management alternatives, especially intensive timber production, short rotation biomass production, and multiple product trade-offs; simulation techniques and use of the microcomputer in forest economics problems. Economic analysis of fire and pest impacts and management strategies with emphasis on prescribed burning.

James G. Yoho, Ph.D., *Professor of the Practice of Forest Investment*; B.S.E., University of Georgia; M.S., Forest Economics, State University of New York; Ph.D., Resource Economics, Michigan State University.

Current research interests: forest investment strategies for private landowners and forest investors under various economic outlooks, institutional constraints or incentives, and investment objectives. International trade in forest products, including demand trends and trade policy.

Lecturers

Frank B. Barick, M.S., State University of New York at Syracuse; *Wildlife Consultant*, Raleigh, North Carolina

Kerry R. Livengood, Ph.D., Texas A & M University; *Nepal Resource Conservation and Utilization Project*

George H. Mason, M.F., Duke University; *The Travelers Insurance Companies*

Clark Row, Ph.D., Tulane University; *United States Forest Service*

Professional Staff

Lillie P. Blalock, *Administrative Assistant*

Debra G. Davidson, M.A., *Associate in Research for International Programs and Acting Placement Director*

Judson D. Edeburn, M.F., *Duke Forest Resource Manager*

Julie D. Gay, B.S., *Senior Professional Program Coordinator*

E. Garrett Martin, Ph.D., *Director of Admissions and Financial Aid*

Mary L. Matthews, M.A., *Public Relations Specialist*

Support Staff

Jean D. Hampton, *Administrative Secretary*
Betty Kuykendall, *Senior Accounting Clerk*
Pamela McAuley, *Secretary*
Terry Wayne Schneider, *Instrument Technician*
Cynthia Wingate, *Secretary*

Faculty Emeriti

Roger F. Anderson, Ph.D., *Professor Emeritus*
Leon Edward Chaiken, M.F., *Professor Emeritus*
Paul Jackson Kramer, Ph.D., *James B. Duke Professor Emeritus*
James Granville Osborne, B.S., *Professor Emeritus*



School of Forestry and Environmental Studies Calendar*

1985

August	
20	Orientation
22-24	Registration for fall semester
26	Fall semester classes begin
27	Drop/add begins
September	
6	Drop/add ends
November	
5-6	Registration for spring semester, 1986
25-29	Thanksgiving recess
December	
6	Fall semester classes end
8-10	Graduate reading period
10-14	Final examinations

1986

January	
4	Registration of all new and nonregistered returning students
8	Spring semester classes begin
9-17	Drop/add period
March	
3-7	Spring break
18-20	Registration for fall semester, 1986, and summer, 1986
April	
18	Spring semester classes end
20-22	Graduate reading period
22-26	Final examinations
May	
4	Commencement

*The dates in this calendar are tentative and subject to change.



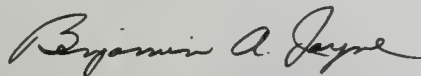
To the Prospective Student

The School of Forestry and Environmental Studies, a professional-graduate school functioning within a great university, focuses its efforts on forestry, natural resources, and the environment. Its Master of Forestry degree is designed to prepare professional forest managers of the future in both the public and private sectors. Its Master of Environmental Management degree is intended for those who wish to prepare themselves in some aspect of the broader field of natural resources. The school offers concurrent degrees with the Fuqua School of Business and the Institute of Policy Sciences and Public Affairs. Its doctoral program is designed for those interested in teaching or in research in a university, branch of government, or industry.

We seek able students who are motivated to research and analyze complex natural resource and environmental problems. We accept undergraduates from many educational backgrounds. However, we expect that each degree candidate will become highly disciplined in some aspect of the analysis of resource problems during the period of study at Duke.

To complement our traditional modes of education, we have introduced several new educational programs during the past few years. A number of students participate in the Integrated Case Studies Program in Natural Resource Analysis and the Integrated Toxicology Program described in this bulletin. Our Senior Professional Program is designed to meet the needs of practicing professionals who wish to update practical skills or to pursue an advanced degree. Internships are available to qualified students. Supporting all of these educational programs are the research interests of an outstanding faculty committed to the advancement of knowledge concerning resources and the environment.

The following pages provide information about our degrees, programs of study, and research. We invite you to visit the Duke campus to meet our students, faculty, and professional staff, and to learn about our school first hand.



Benjamin A. Jayne
*Dean of the School of Forestry and
Environmental Studies*

General Information



Objectives

The School of Forestry and Environmental Studies pursues a broadly based program of research and education at the graduate level. Its programs are designed to educate professionals, scientists, and academicians to analyze a wide range of environmental and natural resource problems.

After nearly fifty years of forestry research and education at Duke, the school has shifted from a focus on woodland productivity and protection to a focus on ecosystem productivity and protection. The land and its associated components, including plant and animal communities, water, and air, are integral parts of the orientation of the school. The emphasis is on defining objectives for forest and natural resource management, understanding the interrelated constraints—physical, biological, ecological, economic, legal, and social—and devising and testing alternative management solutions. Indeed, problem analysis is the central focus of all programs of the school. The student will learn the capabilities and limitations of quantitative analysis and seek imaginative solutions for problems requiring a qualitative approach.

The school is particularly interested in the development of a holistic view of the environment and natural resources. This viewpoint requires the application of knowledge from the natural, social, and management sciences. Students are encouraged to integrate studies in natural resource science, systems science, economics, and policy in the pursuit of a particular program of study. The approach is first to identify problems, then to synthesize information, to develop critical analyses, and finally to plan and design solutions.

This approach is pursued by research, formal courses, seminars, field studies, and special conferences and symposia. Informal contact among students, faculty, alumni, and practicing professionals forms a strong part of the program. A number of academic and professional disciplines are represented on the faculty, and practicing professionals are frequently involved in teaching as well as in research. Several government career employees are usually in residence as adjunct faculty members.

The school periodically sponsors conferences and symposia on subjects of major interest and concern to persons involved in resource management. These offer current viewpoints of outstanding individuals concerned with various aspects of natural resources and the environment.

Programs are designed for students drawn from a wide variety of undergraduate backgrounds in the natural and social sciences and from programs in forestry, engineering, business, and environmental studies. The goal is to help all students acquire the basic technical skills, knowledge, insight, and methods of analysis for solving natural resource and environmental problems.

Because integrated management of natural resources is in the early stages of development in this country and abroad, the school is changing rapidly and extensively. These changes offer many opportunities to explore new areas of research and education, to sharpen the capacity to analyze environmental and resource problems, and to contribute to the development of new professions.

An essential ingredient in this period of changing orientation in the school is a high level of student participation. A special student committee advises the dean and faculty on curriculum content and structure, research programs, degree requirements, and other matters pertinent to the goals of the school. Students serve on most school committees, and they attend faculty meetings on a regular basis. Students also participate regularly in the planning of major conferences and symposia. Within the limit of school resources, students are encouraged to travel to local and regional meetings of professional and scientific societies. These activities are considered to be an essential part of the educational process.

History

Duke University developed from Union Institute, a small school established in 1838 in Randolph County, North Carolina. The name was changed to Normal College in 1851, and in 1859, to Trinity College. The college was moved to Durham in 1892. With the establishment of the James B. Duke Indenture of Trust in 1924, Trinity College became Duke University. At the outset, the University developed around a core of undergraduate programs. Later the Graduate School and professional schools of Medicine, Nursing, Law, Engineering, Divinity, and Business Administration were added. In 1932, forestry instruction was offered for students of Trinity College, and in 1938 the School of Forestry was established as a graduate professional school under the direction of Dean Clarence F. Korstian. The Master of Forestry degree was offered initially and later the A.M., M.S., and Ph.D. were offered through the Graduate School. The school has been fully accredited by the Society of American Foresters since 1939.

Dr. Korstian joined the faculty in 1931 as the first director of the Duke Forest. Brought to Durham by Dr. William P. Few, president of Duke at the time, Dr. Korstian set out to develop a "demonstration and research forest" that would serve as a model for owners of small tracts of timber in the South. During this period and for a number of years to follow, research focused primarily on problems of culture, management, and utilization of the softwoods and hardwoods of southern forests.

During the 1930s the faculty of the school was gradually expanded to include a number of research foresters who made substantial contributions to forestry in the Southeast. William Maughan, who specialized in forest management, joined the faculty in 1931. In 1935, Theodore S. Coile, a specialist in forest soils, was added to the faculty. Ellwood S. Harrar, a wood technologist, and Francis X. Schumacher, widely known for his contribution to forest measurements, arrived at Duke in 1937. In 1939, the school rounded out its initial faculty with three distinguished scientists: Roy B. Thomson in economics, James A. Beal in entomology, and Albert E. Wackerman in forest utilization. This faculty established and brought early recognition to the school. Later, faculty were added in silviculture, pathology, physiology, ecology, and biometeorology.

The expanded faculty was soon responsible for shifting the emphasis from southern forestry to research and teaching of forestry with a national and international point of view. Consequently, graduates of the school have found employment in public agencies, forest industries, education, and research in all parts of the nation.

Growing national concern with natural resources and environmental problems led to a new teaching and research emphasis in the 1970s. A new program in natural resource ecology, focusing on ecologically based land use planning, was added to the traditional forest science and management curriculum. In 1974 the name was changed

to the School of Forestry and Environmental Studies and a new degree was added, the Master of Environmental Management.

Location

Duke University is situated on the outskirts of Durham, a city of over 100,000 inhabitants, in the central piedmont region of North Carolina. The Appalachian escarpment lies approximately 100 miles to the west of Durham and the coastal plain is but a short distance to the east. The school is thus ideally situated near areas of ecological and topographic diversity which offer many opportunities for recreation as well as study.

Piedmont North Carolina is characterized by a rolling, forested topography interspersed with small farms and rural communities in addition to the state's largest cities. The climax forests of the piedmont are hardwoods; however, human disturbance over a period of many years has resulted in the establishment of many forests of the native southern pines. It is in regions like piedmont North Carolina that many of the nonindustrial private forests of the United States are located. These forests are destined to provide much of the increase of wood and wood fiber to be needed by the United States in the twenty-first century.

The southern Appalachians are widely known for their unusual history, picturesque topography, and wide range of flora and fauna. Here the typical hardwood forests which dominate at lower elevations give way to forests of spruce and fir at higher elevations. These forests supply a variety of specialty woods for North Carolina furniture manufacturers and for other industries. The region's numerous recreation areas are widely used for hiking, fishing, skiing, and other outdoor activities.

The coastal plain of North Carolina, already well known for its agricultural production, is now being used extensively by many of the nation's forest industries for plantations of the native pines. The extent of the intensive forestry practices in the coastal plains of North Carolina and other southern states is unmatched elsewhere in the world.

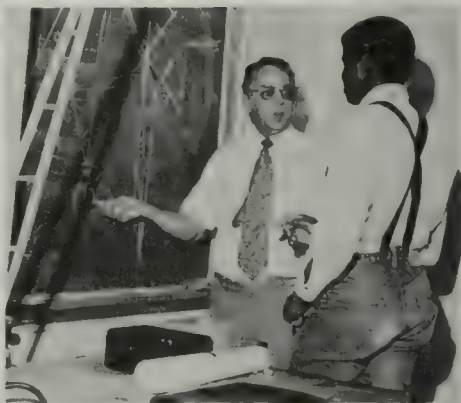
Coastal wetlands and estuaries, now recognized as one of the nurseries of world fisheries, offer abundant and valuable natural resources. North Carolina's Outer Banks and the barrier islands of the other southeastern states serve as protection for these coastal waters. The rapidly increasing population and development in this region make proper management of its natural resources particularly important to the nation.

Because of the school's central location near these regions of vital ecological importance, students are afforded the opportunity to study many current environmental problems in the field. Both the opportunity and the challenge exist to analyze these pressing problems and to develop sound approaches to their management.

Facilities

The School of Forestry and Environmental Studies is housed in the south wing of the Biological Sciences Building on the West Campus. Laboratory and supporting facilities are provided for both teaching and research in all subject matter areas offered in the school. Classrooms and seminar rooms are available in the school and in other parts of the building. A clubroom, offices, and general study space are provided for students.

Computer Facilities. Computing is provided at Duke by the Duke University Computation Center which maintains an IBM 3350 System Complex. The center is connected by high-speed microwave to the Triangle Universities Computation Center (TUCC), a regional computer network located in the Research Triangle Park. The computer equipment at TUCC includes an IBM 3081, an IBM 370 Model 168, and two small Hewlett-Packard 2000 Access computers. Students and faculty in the school



have immediate access to Tucc through facilities in the Biological Sciences Building. A medium-speed card reader/line printer terminal, keypunch units, and a cluster of interactive terminals are easily accessible. Microcomputer laboratories and extensive data processing services are available within the University.

Libraries. The combined university libraries, including the main Perkins Library and nine school libraries, contain over 3,300,000 volumes. About 150,000 volumes are added annually. Approximately 10,300 periodicals and over 166 newspapers are received. The Biology-Forestry Library, located in the Biological Sciences Building, contains about 125,000 volumes, and receives about 900 periodicals.

Greenhouses and the Phytotron. Adjoining the Biological Sciences Building are excellent facilities for biological investigations under controlled conditions. The phytotron contains fifty separately controlled growth chambers and greenhouses which can be used to grow plants under a variety of environmental conditions. The phytotron is one of few such facilities in the United States.

Research Triangle Park. Numerous industrial and governmental organizations have established research facilities in the Research Triangle Park, ten miles from the Duke campus. Government facilities include the National Environmental Research Center of the Environmental Protection Agency, the Forestry Sciences Laboratory of the United States Forest Service Southeastern Forest Experiment Station, and the National Institute of Environmental Health Sciences. These laboratories provide opportunities for student research and internships in some of the most advanced facilities in the nation.

Neighboring Universities. Through a reciprocal agreement, Duke students may supplement their education in forestry and environmental studies by taking courses in related fields at the University of North Carolina in Chapel Hill, North Carolina State University in Raleigh, and North Carolina Central University in Durham. Graduate students of Duke University and the University of North Carolina at Chapel Hill are granted library loan privileges in both universities.

The Duke Forest

The Duke Forest comprises approximately 8,300 acres of land in five major divisions and several smaller tracts. A ten-minute walk from campus will take one well into many parts of the Durham Division, and a network of roads and fire trails makes almost all areas of the forest easily accessible.

The forest lies primarily in Durham and Orange counties, near the eastern edge of the piedmont plateau, and supports a cross section of the woodlands found in the upper coastal plain and lower piedmont of the Southeast. A variety of timber types, plant species, soils, topography and past land use conditions are represented. Elevations range from 260 to 760 feet. Soils of the region are derived from such diverse parent materials as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives.

The Duke Forest, as it is known today, had its origins in the mid-1920s when the University administration bought many small farms and interspersed forest land as buffer areas for the main campus and as an investment for the future. The forest was placed under intensive management in 1931 by Dr. Clarence Korstian, its first director. In its early development, several basic objectives were emphasized: (1) demonstration of timber management techniques on a practical and economic basis, (2) development of an experimental forest for research in the sciences associated with timber growing, and (3) development of the area as an outdoor laboratory for students of forestry.

Modification of these early objectives has arisen, in part, through a greatly increased interest and dependence on the forest for research in the areas of zoology, botany, and ecology by faculty and students at Duke and neighboring universities. Background information useful to researchers is provided by the forest; it covers such features as soils, topography, inventory, plantation, and cultural records as well as a

bibliography of past and current studies. Current work on problems associated with developmental pressures at the urban-rural interface and integrated approaches to natural resource management have multiplied the forest's value and benefit as a resource.

Since 1976, the Duke Forest has been included in a nationwide network of research sites selected by the Institute of Ecology under a program sponsored by the National Science Foundation. These sites, designated as experimental ecological reserves, were selected to provide a wide range of conditions and habitat types for long-term scientific research in a multitude of disciplines.

The forest also serves in an educational and recreational capacity for residents of the Durham and Chapel Hill communities. Hiking, picnicking, jogging, and nature study are particularly popular pastimes.

This natural outdoor laboratory is an invaluable supplement to the instructional, research, and recreational facilities of the school, the University, and the region.

A comprehensive forest management plan, completed in 1981, provides a framework of basic guidelines and policies enabling effective utilization of the forest's potential. Development of the management plan was coordinated by a team of faculty, staff, and students representing a broad range of disciplines. Timber management, recreation, water quality, unique plant communities, historical and archaeological sites, and data management are a few of the criteria that were studied as part of the planning process. The plan concentrates on overlaying compatible uses of the forest in as many areas as possible. The completed document facilitates sound management and decision making, and it is flexible enough to allow adaptation to the changing needs and interests of all users of the forest.

The forest provides assistantships to several students in the school each year. Some of these are associated with research, others with the day-to-day operation and management of the forest.

The Faculty

The faculty of the School of Forestry and Environmental Studies specialize in diverse areas of natural resources and the environment. They are committed to excellence in teaching and to the development of research on current environmental issues facing the nation. A favorable faculty-student ratio insures small classes, individualized instruction, and careful supervision of independent study.

Highly qualified professionals from the United States Forest Service, forestry consulting firms, and other areas of specialization serve as adjunct faculty members. Professors from the Department of Botany at Duke and the Department of City and Regional Planning at the University of North Carolina also hold joint appointments on the faculty. Scholars from foundations, private industry, and government service often visit the school to conduct conferences and symposia, to consult with faculty and students, and to teach special intensive courses.

The faculty is engaged in a dynamic program of research, much of which is oriented toward the analysis of contemporary natural resource and environmental problems. Students are encouraged to assist in these projects to involve themselves in real world situations. Some of the continuing areas of faculty research are indicated in the faculty listing at the beginning of this bulletin. Several faculty members are also involved in the development of case studies, a new approach to graduate training in resource ecology and management.

The school enjoys close relationships with other professional schools and departments within the University as well as at neighboring institutions. Duke's departments of botany and economics, the School of Engineering, and the Institute of Policy Sciences and Public Affairs, for example, offer courses which are highly complementary to forestry and environmental studies. Faculty from these and other de-

partments and institutions actively cooperate in research projects and sit on the graduate committees of students in the school.

The Students

A typical entering class at the School of Forestry and Environmental Studies consists of approximately sixty professional students from diverse backgrounds and geographic areas. In an average class, 45 percent of the students are from the northeast United States and 30 percent are from the South. Approximately 20 percent come from the Midwest and 2 percent from the Far West. Foreign students usually make up about 3 percent of the entering class. One-third of the students are women. Ages of all students have ranged from twenty to fifty-two, although the majority are twenty-five and under.

Educational backgrounds of the professional students are equally varied. On the average, the majority (54 percent) have undergraduate majors in the natural sciences. A smaller number (19 percent) have majors in either forestry, environmental science or earth science. Approximately 5 percent majored in the social sciences and 6 percent in the humanities. An additional 9 percent have dual majors and 6 percent have advanced degrees.

Publications

The Office of Resource and Environmental Publications serves as the center for publications issued by the School of Forestry and Environmental Studies. *FOREM* (an acronym for forestry and environmental management) is a news magazine that reflects all aspects of the school's current activities and achievements, with an emphasis on research. Published twice a year, it is mailed to alumni of the school and to other individuals and organizations throughout the United States upon request. Other regular publications include announcements of intensive courses, conferences, and special programs; a student resume book; and an annual research report. Technical bulletins and conference proceedings are published as part of a continuing series.

The office is under the direction of a publications specialist. Assistantships are offered to students who have photographic, journalistic, or artistic skills.

Degrees



Degrees

Duke University offers professional and research degree programs in forestry and environmental studies. Study can be pursued for a Master of Forestry (M.F.) or Master of Environmental Management (M.E.M.) degree in the School of Forestry and Environmental Studies, or for a Master of Science, Master of Arts, or Ph.D. degree in the Department of Forestry and Environmental Studies of the Graduate School.

The degrees offered through the School of Forestry and Environmental Studies (M.F. and M.E.M.) are professional degrees. They are intended mainly to provide students with the education and experience for careers in resource management.

The Master of Forestry degree concentrates on forest and associated resources, including woodlands, water, wildlife, and recreation, and their management from an ecological and economic point of view. Two programs of study are offered under the M.F. degree: Forest Productivity and Forest Management Science. The graduate with an M.F. degree is qualified for employment as a professional forester in an administrative, staff, or field position with federal or state agencies, forest industries, and other organizations concerned with forest and land management. The M.E.M. considers natural resources in a broader context. The basic objective of this degree is to develop expertise in planning and administering the management of the natural environment for maximum human benefits with minimum deterioration of ecosystem stability. Three programs of study are offered under the M.E.M. degree: Water and Air Resources, Resource Ecology, and Resource Economics and Policy. In addition, students have the option of designing an individually structured program of study under either degree, with the approval of the faculty council.

Students planning careers primarily in teaching and research are urged to follow a course of study in the Graduate School. The Graduate School degrees (M.S., A.M., Ph.D.) are appropriate for the student who wishes to concentrate on a particular area of research in resource science, systems science, or policy.

Requirements for the Professional Degrees

A total of 60 units is required for either the Master of Forestry (M.F.) or the Master of Environmental Management (M.E.M.) degree. Although a student may fulfill part of the degree requirements through an internship or independent study off campus, he or she must complete at least 30 units and spend a minimum of two semesters in residence.

Students' programs consist of a combination of regular courses, independent projects, and seminars. A master's project of at least 4 but not more than 8 units is

required of all students. Course work in other departments of the University and at nearby institutions is available to strengthen students' education in special areas.

A full semester load is 15 units, which should ordinarily consist of a combination of regular courses independent projects, and the master's project for not more than 13 units, plus 2 units of seminars. Not more than four regular courses can be taken in a semester. Permission of the dean is required to take more than 15 or fewer than 9 units in a semester.

As students progress in their programs, they are expected to devote an increasing amount of time to the master's project and to register for more independent project units in a semester. Thus, the student should plan to take fewer units of regular courses during the latter semesters of study.

CONCURRENT DEGREES

Students desiring to earn both an M.F. and an M.E.M. degree can do so by planning their courses appropriately. The requirements for earning both degrees are as follows:

1. The student must qualify for either an M.F. or M.E.M. degree under the requirements set forth above.
2. To be eligible for the second degree, the student must complete an additional 30 units of study composed of courses which would normally be accepted toward the second degree. Two semesters in residence are required. A maximum of 6 units may be allowed for equivalent graduate work done elsewhere.

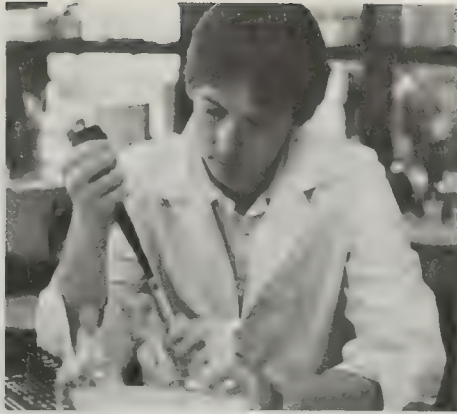
Determinations of eligibility for the degrees, including allowances for work done elsewhere, will be made on individual bases only and will consider the educational background and objectives of the student.

Master of Business Administration. The techniques of management science are applied with increasing frequency in the management of natural resources, and they are also now commonly used in the analysis of environmental problems. To integrate training in these management techniques more effectively into the curriculum, the School of Forestry and Environmental Studies has developed a cooperative arrangement with Duke's Fuqua School of Business. Three years of study are required to earn the combined degrees of Master of Forestry/Master of Business Administration or Master of Environmental Management/Master of Business Administration. Degree requirements in the School of Forestry and Environmental Studies are determined by the faculty council. Normally at least 45 units of credit within the school are required to receive the M.F. or M.E.M. degree. A typical program sequence would involve spending the first year in the School of Forestry and Environmental Studies followed by a year in the Fuqua School of Business and concluding with the final year in either school with elective work in the other.

These concurrent degrees stress concepts, analytical reasoning, and the basic methodologies of management science, while providing the student with a knowledge of current problems in the natural resource industries. Managerial economics, resource economics, organization theory and management, accounting, information and control, resource management, the legal environment, and public policy aspects of resource industries form a substantial component of each degree.

Because of the academic demands of these degrees, those entering without the necessary analytical skills or life science background may be required to take additional work beyond that specified.

Students who wish to undertake both the Master of Forestry or Master of Environmental Management and Master of Business Administration degrees must apply to and be accepted by each of the respective schools. For information on the Master of Business Administration degree, the prospective student should write to the Fuqua



Master of Arts in Public Policy Sciences. As issues concerning natural resources and the environment have become of increasing significance to the nation, there has developed a corresponding need for well-trained policy analysts who can provide timely and appropriate information and analysis to resource policy makers. To meet this need a unique concurrent degree has been developed in cooperation with the Institute of Policy Sciences and Public Affairs. Students pursue a Master of Forestry or Master of Environmental Management degree and a Master of Arts degree in public policy sciences. Doctoral candidates in forestry and environmental studies are also eligible to undertake the Master of Arts in public policy sciences.

The concurrent degree normally takes two and one-half years to complete. The first year is devoted to study in the School of Forestry and Environmental Studies, and the second year is spent in the Institute of Policy Sciences and Public Affairs. The final semester involves work in both areas. Degree requirements in the School of Forestry and Environmental Studies are determined by the faculty council. Normally, at least 45 units of credit within the school are required to receive the M.F. or M.E.M. degree. A summer internship with a resource or environmental agency, or with a related legislative, judicial, or interest group, is recommended.

This degree provides training in the politics and economics of resource and environmental policy making. Emphasis is placed on understanding the social and political forces involved, developing facility with quantitative and logical methods of forecasting, and evaluating policy consequences. Knowledge of the uses and limitations of policy analysis, and an awareness of the ethical dimensions of policy choice are also stressed.

Students must apply to and be accepted by both the School of Forestry and Environmental Studies and the institute. For detailed information on the policy sciences degree, write to Director of Graduate Studies, Institute of Policy Sciences and Public Affairs, Duke University, Durham, North Carolina 27706.

Other Concurrent Degrees. With the special permission of the faculty council and the dean of the School of Forestry and Environmental Studies, students are permitted, on an individual basis, to establish concurrent degree programs with certified graduate degree programs either within or outside of Duke University. In the past, students have designed such programs with law schools, business schools, and graduate engineering programs. As with the other concurrent degrees, the student must be enrolled in the Master of Forestry or Master of Environmental Management degree program for 45 units of credit and in residence for at least one full year.

To gain acceptance of a specially designed concurrent degree, the student must show an official acceptance from another certified graduate degree program. In order to receive the M.F. or M.E.M. degree, the student must have completed 45 units of credit, the master's project, all program area requirements, and at least one full year of study in the other degree program (with an official transcript of work completed). For additional information concerning special concurrent degrees, applicants should consult the Director of Admissions.

Degrees in the Graduate School

In addition to the professional degrees (M.F. and M.E.M.) described earlier, Duke University offers the Master of Arts (A.M.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees in appropriate areas of forestry and environmental studies. These degrees are administered by the Graduate School of the University; however, the bulk of the instruction, research, and advising connected with them takes place in the School of Forestry and Environmental Studies. For administrative pur-

poses, qualified faculty members of the School of Forestry and Environmental Studies comprise the faculty of the Department of Forestry and Environmental Studies of the Graduate School.

Degrees in the Graduate School are appropriate for students desiring to concentrate their study and research within a well-defined area of forestry or environmental studies. Students usually pursue fewer and more advanced topics to a greater depth than do students in professional degree programs. Thus, study in the Graduate School is more appropriate for students preparing for careers in teaching or research in specialized areas, while the broader approach characterizing professional education is more appropriate for students preferring careers in resource management.

Graduate School students emphasize research as major parts of their degree programs. An active research program is a vital component of the School of Forestry and Environmental Studies, and most of the research projects in the school utilize graduate students as research assistants.

Qualification of Students. Students seeking admission to the Graduate School must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. Usually the student should have majored in the area of intended graduate study or one closely related to it. Some work in science and mathematics is essential; however, the total undergraduate education should be well-rounded. Because research is such an integral part of graduate education and of the school's mission, the student's undergraduate record must evidence the capability and motivation to carry out independent study and research at an advanced level.

Policy and Procedures. Policy and procedures for admission, general requirements for degrees, registration, and academic regulations are given in detail in the bulletin of the Graduate School and are not repeated here. In general, procedures, requirements, and regulations are similar in the Graduate School and in the School of Forestry and Environmental Studies. Some differences are noted below.

Admission. Applications for admission to A.M., M.S., and Ph.D. degree programs in forestry and environmental studies should be obtained from and returned to the dean of the Graduate School, Duke University, Durham, North Carolina 27706. However, inquiries about programs of study and research should be sent to the director of graduate studies, School of Forestry and Environmental Studies. On request, the director of graduate studies will arrange to have application materials sent to the applicant.

All applicants for degrees in the Graduate School will have their files screened by the faculty of the Department of Forestry and Environmental Studies of the Graduate School. One of the faculty members must accept responsibility for advising the applicant before admission can be offered.

GENERAL REQUIREMENTS FOR THE MASTER'S DEGREES

Residence Requirements. Candidates for A.M. or M.S. degrees must spend, as a minimum, one full academic year (two successive semesters), or its equivalent in summer sessions, in residence at Duke University. Thirty units of graduate credit constitute minimum enrollment for a master's degree. Additional time to complete course and research requirements is frequently necessary.

Transfer of Graduate Credits. A maximum of 6 units of credit may be transferred for graduate courses completed at other institutions. Consult the bulletin of the Graduate School for details.

The Thesis. A thesis is required of A.M. and M.S. degree candidates. The thesis must indicate the student's ability to collect, arrange, interpret, and report pertinent material on a research problem. Although a publishable document is not required,

the thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures.

The Examining Committee and the Examination. The faculty member who directs the student's program recommends an examining committee composed of himself and two other members of the graduate faculty, one of whom usually must be from a department other than forestry and environmental studies. The committee conducts an examination based on the student's general program and the thesis.

Language Requirements. There is no language requirement for A.M. or M.S. degree candidates in the Department of Forestry and Environmental Studies.

Major and Related Subjects. The student must present acceptable grades for a minimum of 24 units in graduate courses. Of these, at least 12 units must be in the Department of Forestry and Environmental Studies. A minimum of 6 units must be in a minor subject or in related fields approved by the department and by the dean of the Graduate School. A maximum of 6 units may be earned by submission of an approved thesis.

GENERAL REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

The Ph.D. is a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for receiving the doctorate. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

Requirements. The formal requirements for the Ph.D. degree are as follows: (1) major and related courses, (2) foreign language, (3) a supervisory committee for program of study, (4) residence, (5) preliminary examination, (6) dissertation, and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passing grades in all courses and a grade of G or better on at least 9 units.

Major and Related Courses. The student's program of study demands substantial concentration on courses in the department. However, a minimum of 6 units in a related field approved by the department must be included.

Foreign Language. Ph.D. candidates in forestry and environmental studies are ordinarily expected to have a reading knowledge of one foreign language. However, on recommendation of the student's supervisory committee, knowledge of a second language may be required. In exceptional cases, the language requirement may be waived completely.

Supervisory Committee. As early in a student's course of study as is practicable, and not later than two months before the preliminary examination, the director of graduate studies will nominate for the approval of the dean a supervising committee consisting of five members, with one member designated as chairman. This committee will include at least three graduate faculty members from the department and at least one from outside the department. This committee, with all members participating, will determine the program of study and administer the preliminary and final examinations. Successful completion of the final examination requires four affirmative votes. The final examination may be administered by four members if the representative of the related field is present.

Residence. The minimum registration requirement is 60 units of graduate credit, of which not more than 30 units may be accepted by transfer. Since a full program is 30 units per academic year, prospective Ph.D. candidates who enter with the A.B. or B.S. degree must plan to spend in residence a minimum of two academic years; if they

enter with the A.M. or M.S. degree, their minimum residence is one academic year. All students must register for a full course load until they pass the preliminary examination. Those entering with undergraduate deficiencies may be required to take undergraduate courses for which they will not receive degree credit. The student's supervisory committee will determine what requirements above the minimum, if any, the student must meet.

More complete information and requirements for the preliminary examination, the dissertation, and the final examination are outlined in the bulletin of the Graduate School.

Nondegree, Special Status

Persons interested in pursuing graduate studies in natural resources not leading to a professional or a graduate degree may apply for nondegree, special status. Such students may take from 3 to 12 units of course work each semester; they are registered with the University as a student with appropriate privileges; they receive transcripts of work completed for each semester in residence; but none of their courses will count toward a degree to be received from Duke University. Students wishing to study for only one or two semesters or to do postdoctoral work should apply for nondegree, special status. Additional requirements are contained in a later section on admissions.

Programs of Study and Research



In the School of Forestry and Environmental Studies, maximum attention is devoted to the individual student. Emphasis is placed on maintaining the highest standards of scholarship and on relevance to contemporary needs in natural resources study and research.

The educational experience at Duke is enriched by a philosophy of interdisciplinary study that takes to full advantage the breadth of professional offerings in other schools on campus. In addition, the availability of courses at the nearby campuses of North Carolina State University and the University of North Carolina makes the Duke program uniquely strong in intellectual content. Within easy commuting distances formed by the triangle of universities is found the Research Triangle Park where major public and industry-supported research programs provide excellent opportunity for work-study internships and exposure to current topics in research.

The school emphasizes three broad conceptual areas in its instruction and research: applied resource science, resource economics and policy, and quantitative methods. Regular courses, intensive courses, seminars, and special studies are offered in each of the three areas. Preparation for professional employment requires a higher degree of specialization than is characterized by this framework, however. Hence, five programs of study have been designed by the faculty to assure competence in some aspect of natural resources while offering adequate breadth of educational experience. Two of these programs, Forest Management Science and Forest Productivity, are offered under the Master of Forestry degree; the remaining three, Resource Ecology, Water and Air Resources, and Resource Economics and Policy, are offered under the Master of Environmental Management degree. Each program can be used as a foundation for obtaining the A.M., M.S., and Ph.D. degrees.

Qualified students who have interests outside of the structured programs are permitted to design individual programs of study. Pursuit of an individual program requires preparation of a comprehensive statement of objectives and specification of each of the program components: major courses, minor courses, seminars, electives, and a master's project. All individual programs of study are subject to approval by the faculty council.

Program Requirements

Each of the school's programs of study and research have similar requirements within the broad categories discussed briefly below. More specific information about requirements for any one of the programs can be obtained from the director of admissions.

Prerequisites. Students admitted to the school are expected to have had at least one introductory course in calculus, statistics, economics, and computer programming. They are also expected to have had some previous training in the natural sciences or the social sciences related to their area of interest in natural resources. For students who select either the Resource Ecology or the Forest Productivity program, this previous training must include an introductory course in ecology.

Students who do not satisfy all of these prerequisites may be admitted to the school but will be expected to make up these deficiencies during their first year of residence. Elective credits may be used to satisfy up to two deficiencies.

Credit Requirements. Each program requires the completion of 60 units of credit. These units are distributed among a set of required courses constituting the major, elective courses, a set of courses forming the minor, a master's project, and seminars relevant to the program's objectives.

Major courses. Each program requires from six to eight courses (13 to 29 units) in the major area of study. These courses are specified or, in some cases, elective within the limits of the program emphasis.

Elective Courses. Between five to seven elective courses (15 to 24 units) are available to give the student flexibility in developing his or her course of study. These credits are used to add depth to the major area of study or to develop a second area of expertise. Students who select the Resource Economics and Policy Program and who have not had previous training in a natural resource area must use at least three of their elective courses to meet this requirement.

Quantitative and Analytical Minor. All programs require a minor of at least three courses (9 to 12 units) in quantitative and analytical methods related to natural resource analysis, modeling, and management.

Master's Project. A master's project constituting 4 to 8 units of credit is required. These projects take the form of individual or small group research efforts related to some area of natural resource management.

Seminars. All students are required to participate in seminars in their program area for 1 to 3 units of credit. During the spring semester of their second year in residence, students present the results of their master's project.

Forest Productivity

Forest productivity is concerned with the identification, evaluation, and selection of economically, biologically, and environmentally sound management options to increase timber production and other benefits from forest lands. The program integrates biological and physical principles, management science, and economic analysis with silvicultural techniques to enhance forest productivity. This distinctive approach is brought about by close coordination of resource inventory course work; resource-oriented courses such as soils, silviculture, timber production, methods, forest protection, tree physiology and genetics; management-oriented courses such as operations research, modeling, and ecosystem analysis as applied to research and development; and research in forest productivity.

The program emphasizes the use of tree and stand growth and development models to facilitate decisions on the selection of management options to achieve objectives. Various methods of analysis are applied to all forest resources in order to optimize production within the constraints imposed by biological, physical, and economic conditions.

This area of concentration is offered under the Master of Forestry degree. It provides graduates with a variety of skills that qualify them for positions in forest prod-

ucts industries, government agencies, nonprofit organizations, and other groups concerned with the utilization and protection of forests. The program also provides an excellent foundation for the Ph.D. and a career in research.

Forest Management Science

The Forest Management Science program blends the biophysical management of the forest resource with the methods and concepts of modern business administration. The program emphasizes the planning, administration, scheduling, and control of systems for the production of wood and fiber. These operations involve a substantial portion of the assets, personnel, and physical systems necessary to deliver the goods and services of a forest-based organization.

Problem solving related to timber stand manipulation, production planning, harvesting, transportation systems, facility location, manufacturing, inventory control, and related areas are at the core of the program. The student will learn to apply quantitative techniques such as computer modeling, mathematical programming, and simulation. Applied economics and business administration are essential components of this program of study.

Because primary emphasis is placed on methods of problem analysis, the program is suitable for students with a wide range of career aspirations in industrial forestry or public service. Students who complete this program, offered under the Master of Forestry degree, and also complete requirements for the Master of Business Administration degree in the Fuqua School of Business have particularly strong credentials for employment in private industry.

Resource Ecology

The Resource Ecology program is offered under the Master of Environmental Management degree. It is concerned with the application of ecological theory to the manipulation and management of both terrestrial and aquatic ecosystems. An integrated management scheme is advocated; that is, one which takes into account economic constraints, environmental ethics, and political reality.

The framework for the development of management guidelines is provided by these general ecological mandates: the recognition of a hierarchical order of study (organism, population, community, and ecosystem); the prevention of irreversible losses of ecosystem processes; the recognition and understanding of connections among various ecosystems; and the maintenance of ecosystem integrity for future generations.

The applied thrust of the program allows the student to anticipate as well as to answer questions about environmental and ecological management problems. Problem solving is based on the best possible scientific description of ecological processes and relates to appropriate data bases. Applied ecology recognizes the needs of the environmental management user community and provides an organizing framework and an information system to help minimize resource use conflicts.

Mathematical and conceptual models are invaluable in clarifying ecosystem organization. They are essential to describe basic biophysical processes, to test hypotheses, and to predict the response of ecosystems to disturbance. Consequently, a strong background in quantitative methods is required of students in this program, as it is for other programs offered by the school.

The objective of the Resource Ecology program is to train professionals for management or research positions with state or federal natural resource agencies, regional planning bodies, resource development companies, and consulting firms. Graduates of the program have practical experience with the analysis of actual ecological problems such as flooding, disturbance of wetlands, the effects of hazardous substances and fertilizers on ecosystems, integrated pest management, and mining reclamation.

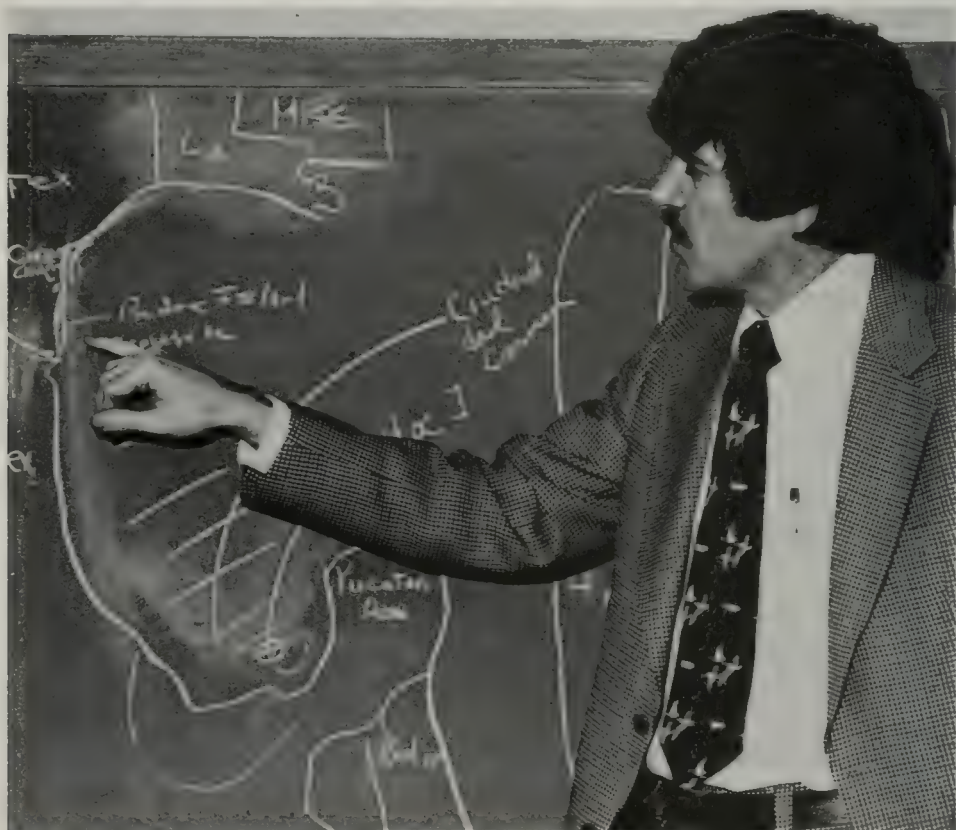
Water and Air Resources

The program in Water and Air Resources is concerned with the management of these renewable natural resources and their interaction with land related resources. Particular emphasis is placed on the effects of land resource management on water quality and quantity and on air quality.

Majors in the program can select one of two areas of concentration: either water resources or a combination of water and air resources.

Course work and other training in the program cover basic hydrologic and atmospheric processes, methods of quantitative analysis, and methods of management and decision making. The basic processes emphasized are those concerned with watershed hydrology; stream and lake water quality; general meteorology and climatology; and the origins, transport, and removal of atmospheric pollutants. Quantitative analysis techniques include statistical methods, probabilistic and deterministic models, and optimization and simulation methods. These courses are integrated with others in water resource management, air resource management, and economic analysis.

Graduates of the program earn the Master of Environmental Management degree. They have the skills to become analysts or consultants for private industry and public agencies concerned with the management and protection of water and air resources. These employers include regional planning agencies, public utilities, fuel and ore extraction corporations, consulting firms, and hydrologic or environmental research centers.



Resource Economics and Policy

Society long has had laws and institutions aimed at regulating the use of natural resources such as forests, range lands, wildlife, water, and minerals. During the past few decades, new institutions have been developed to deal with problems of water and air pollution, toxic substances, and related areas of environmental degradation. These institutions demand a professional who has the necessary expertise to staff both public and private decision-making bodies.

Offered under the Master of Environmental Management degree, the Resource Economics and Policy program is designed to train such decision makers. The program emphasizes the basic methods needed by the professional for analyzing existing policy and for testing the possible outcome of new environmental and resource policy being considered by public and private agencies. The program is highly analytical and is oriented toward the analysis of contemporary problems.

Decision making in natural resource and environmental policy requires mastery of three broad areas of knowledge: the basic sciences pertaining to a natural resource or an environmental phenomenon; the relevant disciplines in the social sciences; and the quantitative methods required for using knowledge from the physical, biological, and social sciences to arrive at a decision.

Courses relevant to renewable and nonrenewable natural resources may be part of the student's educational background or may be planned as part of the master's degree. For the natural resource decision maker, the most important social sciences are resource and environmental economics, political science, and legal analysis. Economics includes production economics, the economics of public goods and externalities, public finance, and the intertemporal allocation of natural resources. Political science includes the behavior of administrative agencies, regulatory agencies, and legislative bodies. Legal analysis emphasizes the allocation of resources as reflected in property rights and environmental risks as reflected in torts. Quantitative methods, an essential component of this program, includes statistical inference, methods of optimization, and decision theory.

Students in the program have the opportunity to assist in ongoing research projects in the school's Center for Resource and Environmental Policy Research and the nearby Southeastern Center for Forest Economics Research. Such training provides a comprehensive background for a wide range of resource analysis and management careers.

Center for Resource and Environmental Policy Research



Acting Director

Benjamin A. Jayne, *Professor*

Faculty

George F. Dutrow, *Adjunct Associate Professor*

Milton T. Heath, *Adjunct Professor*

William Hyde, *Associate Professor*

Kenneth H. Reckhow, *Assistant Professor*

Curtis J. Richardson, *Associate Professor*

Jack P. Royer, *Assistant Professor*

J. Michael Vasievich, *Adjunct Assistant Professor*

The Center. The Center for Resource and Environmental Policy Research is committed to objective and timely analyses of critical natural resource and environmental issues. Emphasis is given to land, forest, water and air resources, and to energy. The center's agenda includes problems characteristic of the managed forests of the Southeast, the coastal zone, and the recreational lands of the Appalachian region. However, the interests of the scholars and students associated with the center are not limited to the Southeast. Rather, policy issues of national, and sometimes international, flavor are the subject of investigation.

The center was developed in response to recognition of the many conflicts developing over competitive use of natural resources and consequent legislative regulation. Clearcutting of national forests, timberland taxation policy, and land use in coastal zones are indicative of the resource-environmental issues that have elicited concern.

During the past few years, a substantial and comprehensive body of legislation has been enacted to address resource and environmental problems, much of it strongly influenced by information provided by special interest groups. Often, this legislation has been drafted and passed in a quasi-crisis atmosphere with a consequent absence of mature deliberation.

Because contemporary resource-environmental problems are deeply embedded in the social, economic, and political fabric of the country, they are in need of careful and deliberate study. It is in the national interest that such issues be examined in a setting conducive to independent thought with appropriate regard for timeliness of results and conclusions. The Center for Resource and Environmental Policy Research at Duke University is designed specifically to provide the proper setting for such an approach.



Among the current research programs are:

- Land Use Planning and Rural Development
- Energy Systems Policy
- Policy for Resource-based Industry Development
- Educational Research and Policy Issues
- Policy Development and Political Feasibility
- Water Resources Policy
- Historical, Cultural, and Ethical Considerations in Resource and Environmental Policy
- Resource Economics and Policy
- Forest Planning and Protection Policy
- Environmental Risk Analysis
- International Resource and Environmental Policies

The Center Organization. The center is by design and intent a flexible, multidisciplinary unit. Headed by a director and staffed by an interdisciplinary faculty, the center offers opportunities for involvement to executives, administrators, political representatives, mid-career professionals, academicians, and graduate students. A major aim is to bring together special groups of scholars and professionals to focus their attention on contemporary resource and environmental research problems.

The center is viewed as an all-campus unit at Duke University, drawing primary support from the School of Forestry and Environmental Studies while maintaining strong associations with the Schools of Law, Business, and Engineering, and the Institute of Policy Sciences and Public Affairs.

Beyond the Duke campus, the center maintains close ties with officials from government and industry and the faculty and students of other universities, particularly the University of North Carolina and North Carolina State University.

Several members of the center's faculty are allied with the Southeastern Center for Forest Economics Research. This consortium, headquartered at the Research Triangle Park, is sponsored by the United States Forest Service and several regional universities.

Graduate Study. The center provides opportunity for graduate study at the master's and doctorate level in two major areas, policy and economics, and provides minor emphasis in these same topics to students from other subject areas. Degrees are offered through the School of Forestry and Environmental Studies; in addition, concurrent degrees may be developed with the Institute of Policy Sciences and Public Affairs and with the Fuqua School of Business. Students interested in the degree program should contact the center director for a current course list and for formal admission.

For the student interested in a graduate research program at the M.S. or Ph.D. level, individually designed programs of study are directed by the center faculty in accordance with Graduate School policy.

The center offers graduate assistantships to qualified students in resource and environmental policy research. Support is available to students pursuing M.S., A.M., or Ph.D. degrees through the Graduate School at Duke University and M.F. or M.E.M. degrees in the School of Forestry and Environmental Studies.

Center for Forestry Investment



Director

William K. Condrell, *Adjunct Professor*

Associate Director

James G. Yoho, *Professor of the Practice of Forest Investment*

Faculty Associates

George F. Dutrow, *Adjunct Associate Professor*

Daniel H. Gelbert, *Adjunct Assistant Professor*

Benjamin A. Jayne, *Professor*

George H. Mason, *Lecturer*

Clark Row, *Lecturer*

Jack P. Royer, *Assistant Professor*

William R. Sizemore, *Adjunct Professor*

J. Michael Vasievich, *Adjunct Assistant Professor*

Board of Advisers

Charles Dickey, *Scott Paper Company*

John Maquire, *USDA Forest Service, Retired*

Peter McLaughlin, *Union Camp Corporation*

Max Peterson, *USDA Forest Service*

Andrew Sigler, *Champion International Corporation*

Dennis E. Teegarden, *College of Natural Resources, University of California at Berkeley*

Objectives of the Center. The Center for Forestry Investment is devoted to a broad program of education and research that is concerned with all aspects of private forest investment under a free market system and private ownership of property. While its geographic focus is essentially national, the center has a strong orientation to the main commercial forest region of North America.

The center provides a focus on a critically important area dealing with future timber availability in the United States. Heretofore, there has been no central place to consider the effects of national policies on the need to stimulate forest investment. Policies dealing with taxes, appraisal, insurance, and financial and institutional needs have been developed largely without respect to the central question of how to meet both domestic requirements and export markets for forest products.

Forest investments warrant particular attention because they are unique in many respects. They are capital intensive, long term, and offer only modest yields. Given these characteristics, it is a challenge to a free market economy to facilitate the investments required to supply the nation with low-cost timber products while leaving a surplus for export to world markets. At the same time, this must be accomplished without detriment to the forest resource.



Organization and Administration. Headed by a director and an associate director, the center is a flexible, multidisciplinary unit based in the School of Forestry and Environmental Studies. It maintains close ties to other professional schools and departments within Duke University. It also draws upon the school's Center for Resource and Environmental Policy Research, the Forest Service's Southeastern Center for Forest Economics Research, the forest products industry, trade associations, and the insurance and financial communities for instructional assistance, advice, and consultation.

Activities of the center include conferences, symposia, and workshops dealing with the major substantive areas affecting forestry investment. Intensive courses in forest appraisal, timberland investment analysis, accounting and control systems, and forest taxation as well as other pertinent subject areas are offered through the center as part of the school's Senior Professional Program. Regular, semester-long courses are offered through the center as part of the curriculum in Forest Management Science.

Comprehensive and scholarly research in the broad area of forestry investment is central to the mission of the center. Among the research topics are

- Investment opportunities and methods
- Barriers to adequate investment growth
- Appraisal, valuation, and accounting systems
- Insurance and risk management
- Issues related to property, income, and estate taxation

Publication is also an important function of the center. Conference proceedings are published as are reports on research findings. Such findings may be published as bulletins or as articles in appropriate scholarly journals.

Opportunities for Graduate Study. Specifically tailored programs of study and research may be designed to meet the goals of individual students and supervised by faculty members associated with the center. Programs leading to the Master of Forestry or Master of Environmental Management degree are administered by the School of Forestry and Environmental Studies.

For students interested in graduate research at the M.S. or Ph.D. level, individually designed programs of study are directed by faculty associated with the center in accordance with Graduate School policy.

Financial support for study and research may be available for the individual student if his or her interests contribute to the center's research objectives.

Alternative Educational Opportunities



Integrated Toxicology Program

The School of Forestry and Environmental Studies houses the ecotoxicology track of Duke University's graduate program in toxicology. The Integrated Toxicology Program operates under a specific charter to develop holistic and innovative approaches to toxicology training and to provide three training tracks: (1) general toxicology, with broad training in the principles and concepts of toxicology; (2) specialized toxicology, emphasizing such areas as pulmonary toxicology or biochemical toxicology; and (3) ecotoxicology.

The study of ecotoxicology focuses on the principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and effects of toxics on humans and ecosystems. The curriculum is designed to teach the student the basic principles of biochemistry, physiology, toxicology, pathology, and ecology along with specific skills in ecosystem analysis, environmental health, epidemiology, statistics, and risk analysis so that he or she can design, execute, and interpret experiments in ecotoxicology.

Completion of this training program at the Ph.D. level provides career opportunities in academia, industry, and research laboratories. Master's candidates are trained for careers in industry, consulting firms, and government agencies concerned with the management of hazardous substances.

An ecotoxicology student is affiliated as a postdoctoral fellow or graduate student (Ph.D. or M.E.M.) in the School of Forestry and Environmental studies or the Duke Marine Laboratory. All students are required to complete the core sequence of the Integrated Toxicology Program and the ecotoxicology track requirements in addition to specific degree requirements.

Students seeking admission to the program as a Ph.D. candidate make initial application to the Graduate School for admission to the Department of Forestry and Environmental Studies. Candidates for the Master of Environmental Management degree apply directly to the School of Forestry and Environmental Studies. Fellowships are available to outstanding students. Further information on the program can be found in the bulletin of the Integrated Toxicology Program.

Integrated Case Studies in Natural Resource Analysis

The case study approach to graduate education affords the student an opportunity to develop analytical and management skills through a close look at problems in resource management and policy. Case studies are used in class instruction in both traditional and intensive courses in several of the school's study areas.



In addition to utilizing completed case studies as course materials, students also have the opportunity to participate in the research and preparation of new case studies. The process of case preparation brings one in contact with professionals, businessmen, and others and offers a bridge between the academic curriculum and practical experience. This experience and the contacts made in the process of case research are valuable assets in securing employment.

The case studies are termed "integrated" case studies in natural resource analysis because they result from the cooperative efforts of a team of investigators comprising resource-ecologists, -economists, and -planners, as well as political scientists, sociologists, and others. The team approach is used in recognition of the fact that the successful analysis and resolution of the nation's complex resource and environmental problems requires a holistic perspective. Optimally, this results in an exploration of the full ramifications of utilizing natural resource systems.

One objective is to disseminate results of the integrated case studies beyond the walls of the School of Forestry and Environmental Studies. User groups have ranged from federal agencies to local and regional planners. Reflecting these diverse audiences, case study formats have varied. For example, projects have resulted in color and sound 16mm films, simulation games and workshop/conferences, as well as written reports. Typical issues addressed by past case studies include highway siting, emergency hazardous waste disposal, back country management, forest management, and the development of wetlands.

Financial assistance, in the form of graduate fellowships, is available to qualified students interested in case study analysis. Up to 8 units of academic credit may be earned for case study work. Arrangements are made in consultation with the student's faculty adviser and the case studies director.

Intensive Courses

Intended for both practicing professionals and advanced full-time students who are pursuing careers in resource management, policy, and environmental science, the intensive courses offer an alternative to traditional full-semester courses. The sessions are designed to allow regular students to blend theory with practical experience as well as to allow experienced professionals to update theory and methodology. Recognized subject matter specialists provide instructional resources not normally available to the University community. The result is an enriched educational experience through the exchange of ideas and information by participants of diverse backgrounds.

The intensive courses are organized into week-long modules and classes are held three or more hours a day during the week. A course consists of one, two, or three modules, each a discrete unit of study which may be taken alone for credit. In multi-module courses, however, the first week may be a prerequisite to other weeks in the series.

School of Forestry and Environmental Studies students (M.F. and M.E.M. degree candidates) earn 1 to 3 units of credit for each intensive course. Registration is limited to seven full-time students in their second year of study. Students may not register for more than two intensive courses in a semester or four intensive courses in a degree program without special permission from the dean.

Courses in the intensive course series are listed in a special section in the chapter "Courses of Instruction" in this bulletin. They also are described as part of the Senior Professional Program. A brochure containing complete information on the intensive courses to be offered during a semester may be obtained from the school office.

Internships

An internship with a public agency, a forest industry, or an environmental consulting firm can be a valuable part of graduate professional education. Candidates for either professional degree may arrange an internship of three to six months' duration. The student is required to spend at least two full semesters in residence at Duke prior to accepting an internship and must return to the University for at least one full semester following completion. Academic credit can be earned for an internship; however, in order to receive credit, a plan of study must be prepared in advance and approved by the student's faculty adviser and the dean. The internship must contribute substantially to the educational objectives of the student. With approval, students may use a part or all of the intern experience to fulfill the master's project requirement. Further information may be obtained from the school office.

International Studies

The School of Forestry and Environmental Studies has a history of contribution to international education and research. Graduates of the school, some of them foreign nationals, hold significant positions in many countries—in multinational corporations, United States government agencies, or resource and conservation organizations that have global responsibilities. Members of the faculty have served overseas in programs of teaching and research, in both the developed and developing parts of the world.

The contemporary need for greater attention to international studies has led the school to develop professional associations and curriculum options for students who wish to combine international interests with study of natural resources and the environment. Duke University is a member of the South-East Consortium for International Development, the South Atlantic States Association for Asian and African Studies, and the Organization for Tropical Studies. On campus, an active Center for International Studies provides a rich array of educational and research opportunities with global emphasis. Within the school, an international programs coordinator develops projects and aids students who have international interests.

Recent work at the school has included resource conservation and utilization projects in Nepal and Sri Lanka, educational development in Saudi Arabia, study of tropical forests in Latin America, and study of United States/Canadian interdependence on natural resources. The potential for student participation in these and other projects offers educational enrichment. In addition, students in the school may elect area studies or languages to further their understanding of global issues and cultures.

The school welcomes foreign students and considers an international student body of value to the learning environment. Through both formal and informal interaction, students from various cultures exchange information and opinions on resource and environmental problems and their alternative solutions. Qualified foreign students in Trinity College and in graduate and professional schools of the University are admitted to courses in the school, subject to the approval of the student's dean and the dean of the School of Forestry and Environmental Studies.

Cooperative Colleges

The Cooperative College Program is designed to coordinate the education of students in selected undergraduate schools with graduate programs in the broad area of resources and environment offered at Duke. Students are accepted for either of two degrees, the Master of Forestry (M.F) or Master of Environmental Management (M.E.M.). Although the program is designed to accommodate a wide range of undergraduate backgrounds, experience of several years indicates that it is best suited to

majors in one of the natural or social sciences, pre-engineering, business, natural resources, or environmental science.

The program accepts students after three years of undergraduate study or upon completion of the baccalaureate. With appropriate guidance, highly qualified students can reach a satisfactory level of preparation for graduate work at Duke in three years of coordinated undergraduate study. The baccalaureate degree is awarded by the undergraduate school after the student has earned enough units at Duke to satisfy the requirements of the undergraduate institution. Minimum time required to complete the bachelor's degree is two full-time semesters at Duke. After four semesters at Duke, in which a minimum of 60 units of credit is earned, students may qualify for one of the professional master's degrees.

A student interested in entering the Cooperative College Program should apply to one of the participating schools. Each can provide information on courses of study and bachelor's degree requirements. Students applying for admission to Duke after the third year of study should do so early in the first semester of the third year. Students applying for admission after completion of the baccalaureate should return completed application materials by 15 February. Applicants to Duke are considered regular applicants for admission and are judged by the same criteria; therefore, students should submit application forms, transcripts, letters of recommendation, and results of the Graduate Record Examination.

Senior Professional Program



Keeping up with new knowledge presents a challenge to all professionals. For the natural resource based industries and agencies, the problems of technical change are compounded by rapidly changing social, political, and economic values. The forest resource, for example, must be managed to produce a reasonable return on investments as well as to provide a reliable source of future raw materials. The forester of today must be well-versed in the techniques of forest management and those of resource analysis to ensure financial solvency in times of increasing economic stress. An understanding of the management sciences and the concepts of operations research is also vital. Few foresters have this background, however, and few are able to combine formal, continuous educational programs with the day-to-day pressures of a career.

The School of Forestry and Environmental Studies recognizes the need for contemporary educational opportunities for professionals in the field and for efficient use of the individual's time. The Senior Professional Program is intended to provide working professionals with an opportunity to come to Duke University either to update managerial skills or to earn a professional master's degree with a minimum period of residence. The program offers symposia, managerial seminars, intensive courses, and regular University courses for qualified professionals.

Fellowships-in-residence and senior internships also are available. Elements of the program may be taken for intellectual gain, for certified continuing education credit (CEU), or for graduate credit. Formal degree work may be carried out through a combination of approaches.

The Senior Professional Program allows the participant to tailor an educational experience to individual needs. A brief description of opportunities follows. Inquiries for further information may be addressed to the Office of the Dean.

Symposia and Managerial Seminars

The School of Forestry and Environmental Studies annually sponsors one- or two-day symposia and seminars. Recent sessions have dealt with alternative uses of coastal wetland ecosystems, United States and Canadian interdependence on natural resources, and data and information needs for nonindustrial private forests. Managerial seminars have covered such topics as legal problems in woodlands operations, financial accounting, and principles of taxation applied to the forest industries. Presentations at these meetings are made primarily by outside experts, with Duke faculty serving as moderators and panelists. Although participants in the symposia and seminars do not earn academic credit, they do have an excellent opportunity to meet other professionals, exchange ideas, and increase their knowledge in the area of discussion.

Intensive Courses

The cornerstone of the Senior Professional Program, the intensive courses cover a wide variety of topics focusing on the management and analysis of forest, land, and water resources. Subject matter is changed periodically in response to the needs of working professionals. Instructors are experts who have an established reputation in their respective fields. As a result, participants are exposed to up-to-date, state of the art information that is available from few other sources.

The intensive courses are structured as week-long modules in which classes meet twice a day for a minimum of fifteen lecture hours. The classes often include workshops and independent or group projects in addition to formal lectures in a classroom setting. Ample time is allowed for informal discussion with the instructor and other class members.

All professionals receive a certificate of recognition upon completion of an intensive course. Those who wish may receive certified continuing education credit (CEU) by so specifying upon registration. Participants who are admitted to the School of Forestry and Environmental Studies as candidates for the Master of Forestry or Master of Environmental Management degree may take certain intensive courses as part of degree requirements. These students may earn 1 to 3 units of credit for an intensive course.

Intensive courses are listed in a special section in the chapter "Courses of Instruction" in this bulletin. A brochure describing the Intensive Course Program, courses offered during a particular semester, registration procedures, and fees is available upon request.

Fellowships in Residence

Fellowships in residence are available through the Senior Professional Program to provide study periods of varying length on the Duke campus. Fellows may take formal courses or work on independent study projects or research under the direction of a faculty member. Graduate credit may be awarded where appropriate to fellows who are admitted to the School of Forestry and Environmental Studies as degree candidates. A limited amount of financial assistance is available.

Senior Internships

An internship may be developed to allow study in a designated corporation or agency at the administrative level. The internship is tailored to individual needs and is subject to approval by the sponsoring organization and by the school. A senior member of the host industry or agency is asked to serve as adviser to the intern and as liaison for program development and evaluation by the school. Planning, interim reports, and final reports are supervised by a member of the school faculty. Normally, the internship is a part of a graduate degree program; graduate credit may be earned.

Master's Degrees for Professionals

Qualified professionals may be admitted to the School of Forestry and Environmental Studies as part-time students. By taking a three-month leave of absence from their jobs, these professional degree candidates spend a full semester at Duke enrolled in regular, graduate level courses. Up to 15 units of academic credit are taken during this time. The remaining 15 or more units of credit needed for a Master of Forestry or Master of Environmental Management degree may be earned in absentia or on campus as career responsibilities permit. Part-time degree candidates have up to five years in which to complete all requirements.

Specific degree requirements for students in the Senior Professional Program, including required courses and the number of academic units necessary to complete the degree, are established by the faculty council upon evaluation of the individual's previous education, working experience, and career goals. A minimum of one semester in residence and 30 units of credit are required. A master's project, which may be completed in absentia, representing 4 to 8 units of credit also is required.

Applicants for degrees through the Senior Professional Program follow the same application procedures as regular students in the school. Applications must be submitted by February for the fall term and by October for the spring term. Normally, degree candidates in the Senior Professional Program take the required semester in residence during the term following admission.

Program Evaluation

An advisory board drawn from the major forest industries, consulting firms and government agencies reviews the Senior Professional Program to assure the quality and relevance of its offerings. Their recommendations help to determine intensive course content, instructor selection and qualifications, and program structure. The School of Forestry and Environmental Studies is therefore confident in offering the Senior Professional Program as an effective and economical means of educating professional resource managers without serious career disruption.

Career Counseling and Placement



Placement

The School of Forestry and Environmental Studies operates its own career planning and placement services for all incoming students, graduate and professional students, and alumni of the school. Assistance is given to students in finding summer employment and internships following completion of the first year of study, permanent employment upon graduation, and mid-career changes of employment.

Career Planning Seminars. Individual career counseling and group workshops are provided by a professional staff member to assist students in the development of job search strategies and skills, resume preparation, and interviewing techniques.

Job Search Assistance. The Office of Student Placement maintains a current listing of employment opportunities from private industry; local, state, and federal governments; universities; and nonprofit organizations. A number of career planning and placement resource materials are housed in the office. A placement bulletin, published monthly, lists vacancies and pertinent placement information and is available to students and alumni.

A resume book is published annually by the school and distributed nationally to potential employers. Students are encouraged to prepare and submit resumes, with the assistance of the staff, for publication. Employer response to the resume book has been favorable, and many students have received initial contacts and invitations to interviews as a result.

On-campus Interviews. Each year the School of Forestry and Environmental Studies placement office, in conjunction with the Duke University Office of Placement Services, 214 Flowers Building, invites representatives from a number of firms and government agencies from throughout the country to visit the school to interview degree candidates registered with the University placement services. Students are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. All dossiers are kept in the University's Office of Placement Services to insure confidentiality. Students are strongly urged to begin formulating their job-hunting strategies and implementing the job search at least six months prior to graduation.

Employment Offers. The success experienced by degree candidates in securing employment serves as a strong testimony to the value of graduate/professional study at Duke. Students are encouraged to seek career-related summer employment, part-time employment and internships, and to gear their educational program to a spe-

cialized area in order to increase their employment marketability. Beginning salaries vary, depending upon the educational specialization, capabilities, and prior experience of the candidate as well as the type of organization and geographical region in which he or she is employed. For recent graduating classes, beginning salaries have ranged from \$12,000 to \$26,000 annually with candidates having some prior experience and/or advanced quantitative skills commanding the higher figures.

A survey of the 1970 to 1982 School of Forestry and Environmental Studies graduates revealed some important insights into employment patterns and labor market trends. Traditionally, the major employers of forestry graduates have been educational institutions and the United States Forest Service. Since 1970, the percentage of graduates employed with these institutions has decreased. Although some graduates still enter these fields, a far greater number now enter management, administration, or research with forest products industries or environmental consulting firms. An increasing number of graduates are becoming involved in research, planning, policy making, and management for local governments, state and county forestry commissions, natural resources departments, and federal protective agencies. Others are researchers or consultants for international organizations, public and private.



The following is a list of selected organizations with which graduates of the past several years are affiliated.

The Aerospace Corporation	National Park Service
Agriland Associates	Government of Nepal
Alabama Forestry Commission	New Hampshire Office of State Planning
American Forest Institute	North Carolina Department of Natural Resources and Community Development
Appleton Papers, Inc.	North Carolina State University, Agricultural Extension Service
Arkansas Nature Conservancy	Oak Ridge National Laboratories
City of Baltimore, Maryland	Ohio Agricultural Research and Development Center
Bartlett Tree Expert Company	Oklahoma Scenic River Commission
Battelle Columbus Laboratories	Oswego County, New York, Department of Planning
Boise Cascade Corporation	Pacific Environmental Services
Buckeye Cellulose Corporation	Peace Corps
Champion International Corporation	Quinault Indian Nation, Department of Natural Resources
Chesapeake and Potomac Telephone Company	Radian Corporation
Chesapeake Corporation of Virginia	Research Triangle Institute
Clemson University, Department of Recreation and Park Administration	Resources for the Future
Connecticut Department of Environmental Protection	Scott Paper Company
Container Corporation of America	South Carolina Commission of Forestry
Government of Costa Rica	South Carolina Nature Conservancy
Crown Zellerbach Corporation	South Dakota Division of Conservation
Duke University, School of Forestry and Environmental Studies	TRW, Environmental Engineering Division
Duke University, Center for International Studies	Union Camp Corporation
Environmental Research and Technology, Inc.	United States Agency for International Development
Florida Division of Forestry	United States Bureau of Land Management
GCA/Technology, Inc.	United States Bureau of Reclamation
Georgia-Pacific Corporation	United States Department of Agriculture, Forest Service
Green Diamond Forestry Service	United States Environmental Protection Agency
INTASA, Inc.	University of Florida, School of Forest Resources and Conservation
International Paper Company	University of Maine, School of Forest Resources
ITT Rayonier, Inc.	WAPORA, Inc.
Ketron, Inc.	Westvaco Corporation
King County, Washington	West Virginia Department of Agriculture
Louisiana-Pacific Corporation	Weyerhaeuser Company
Maryland Department of Agriculture	City of Wilson, North Carolina
Maryland Land Trust	
The Mead Corporation	
Montana Division of Forestry	
National Bank of North America	
National Forest Products Association	

Admissions



The student contemplating study at Duke in natural resources and the environment can enter either the School of Forestry and Environmental Studies or the Graduate School. Admissions procedures differ somewhat depending on the choice of degrees. The professional degrees, consisting of the Master of Forestry (M.F.) and Master of Environmental Management (M.E.M.), are administered by the School of Forestry and Environmental Studies. Students wishing to earn either of these professional degrees should apply directly to the school. Those preferring to earn a Master of Science (M.S.), Master of Arts (A.M.), or Doctor of Philosophy (Ph.D.) degree should apply to the Graduate School. Students contemplating study for the Ph.D., but who are undecided at present, may find it desirable to complete one of the professional master's degrees in the school (M.F. or M.E.M.) and apply to the Graduate School for admission to the Ph.D. program at a later date.

Admission to the School of Forestry and Environmental Studies

The School of Forestry and Environmental Studies welcomes applications from men and women of all backgrounds who seek an intellectually challenging education designed to prepare them for leadership in a wide variety of natural resource and environmental positions. The programs do not require previous study in forestry or environmental studies. However, they are designed primarily for students with a degree in one of the natural or social sciences (including chemistry, biology, physics, economics, earth sciences, environmental sciences, mathematics, and political science) or a preprofessional area such as forestry, engineering, or business.

Admission is open to men and women who hold a bachelor's degree from an accredited college or university or who have completed at least three years of study in an institution participating in the Cooperative College Program. Students who do not have a bachelor's degree and are not enrolled in one of the cooperative colleges may apply to the school for special eligibility. Special eligibility is granted in a limited number of cases to individuals who can meet the school's admission criteria and who have completed the equivalent of 90 semester hours of acceptable undergraduate credit. Those interested in consideration for special eligibility must receive approval from the director of admissions before submitting an application.

Admission as a special or nondegree student may also be granted under appropriate circumstances.

Recommended Preparatory Courses. Course work in the School of Forestry and Environmental Studies is taught at a level which assumes that students have had at least one year of biology, economics, and college-level mathematics. In addition, one

course in ecology is highly desirable. Preparation in biology should include some work in botany. Courses in economics should have a significant component of microeconomics. Preparation in mathematics should include courses in statistics and calculus. Since considerable emphasis is placed on use of the computer during graduate study at Duke, course work in computer science is suggested. Additional preparation is desirable for students entering some specific programs.

Although students without the level of preparation described above may be accepted for admission, it is expected that deficiencies will be made up prior to entrance by means of formal course work, independent study, or other arrangements agreed upon by the applicant and the school. A limited number of deficiencies may be made up during the first year of residence. Up to two elective courses may be used for this purpose. Students will be notified upon admission of any apparent deficiencies.

Admission Criteria. Admission to the School of Forestry and Environmental Studies is highly selective. Academic performance as an undergraduate, scores on the Graduate Record Examination, and full-time work experience are the primary factors. Recommendations, the statement of educational goals, extracurricular activities, part-time and summer work experience, and other information requested on the application also provide a basis for selection.

The Admissions Committee considers each applicant as an individual. It attempts to evaluate each candidate for his or her academic potential, professional promise, and ability to benefit from and contribute to the goals of the school.

Application Procedures. Except in unusual circumstances, students are admitted only at the beginning of the fall term. Applications are accepted at any time; however, applications which include requests for financial aid must be submitted by 15 February preceding the fall in which admission is desired. Because the school processes applications from more qualified students than it can admit, early submission of applications is recommended.

Students who, because of unusual circumstances, wish to begin their studies in January should complete their application no later than 15 October prior to their matriculation. It should be noted that all financial awards are allocated to students beginning in the summer or fall, and no awards will be considered for January applicants.

Application for admission to the Master of Forestry and Master of Environmental Management degrees is made through the Office of Admissions of the School of Forestry and Environmental Studies. All correspondence should be addressed as follows: Director of Admissions and Financial Aid, School of Forestry and Environmental Studies, Duke University, Durham, North Carolina 27706.

Each applicant must submit the following before action can be taken:

1. application form;
2. transcripts from each undergraduate and graduate school attended;
3. three letters of recommendation;
4. scores on the aptitude (verbal, quantitative, and analytical) test of the Graduate Record Examination;
5. a nonrefundable application fee of \$35.

Application Forms. No applicant will be considered until the completed application form and related documents are received by the director of admissions. The Admissions Committee attaches considerable weight to the statement of educational objectives submitted by the applicant. This statement should reflect well-defined motivation to pursue graduate study. The school is particularly interested in applicants who show leadership potential in the broad field of natural resources and the environment. Applicants are expected to demonstrate the maturity and sense of purpose essential to a demanding educational experience, including a concept of the value of professional education to the applicant's career plans and expectations.

Transcripts. Official transcripts of all undergraduate and graduate study should be sent directly to the director of admissions by the registrar of each institution attended.

Letters of Recommendation. Each applicant is required to arrange for the submission of three letters of recommendation, preferably on the form supplied with the application. These recommendations provide the Admissions Committee with evaluations of the applicant's past performance in academic and employment related situations. Although recommendations from any source are acceptable, at least one job related recommendation and one from a college instructor or administrator are desirable.

Graduate Record Examinations. All applicants for degree programs must take the aptitude test (verbal, quantitative, and analytical) of the Graduate Record Examination (GRE). Although not required, applicants are encouraged to take an advanced test and submit the score as additional information for admission. The GRE is administered by the Educational Testing Service at locations throughout the world. Applicants are urged to take the exam at the earliest convenient date. Scores on tests taken later than October may not reach the school until after the 15 February deadline for application for financial aid. Scores should be reported directly to the director of admissions. Registration forms may be obtained by writing to GRE, Educational Testing Service, Princeton, New Jersey 08540.

Application Fee. A nonrefundable application fee of \$35 is required of all applicants. A personal check, money order, or cashier's check made payable to Duke University is acceptable. Applications will not be officially received or processed until the required fee has been paid.

Interviews. An interview with a member of the Admissions Committee is not required but may be helpful to the applicant as well as to the school. Consequently, those applicants who can visit the school are encouraged to do so. The interview presents an excellent opportunity for the applicant to ask questions, gain insight into the school, and bring items of concern to the attention of the Admissions Committee. Applicants are encouraged to allow sufficient time to visit classes, meet students and faculty, and tour the University and Duke Forest.

In general, interviews can be scheduled on weekdays throughout the academic year. Appointments should be made at least two weeks in advance. Visits during the summer months are possible but should be scheduled well in advance.

Each year faculty or other representatives of the school travel throughout the country to visit undergraduate schools. Applicants from the cooperative colleges should check with their program adviser for details of these visits. Applicants from other institutions interested in meeting with a representative of the school should write or call the director of admissions. In addition, it is sometimes possible to arrange an interview with an alumnus, particularly where distance precludes travel to Durham. In all of these situations the emphasis is on exchanging information with the applicant.

For further information or to arrange an interview, applicants may write to the director of admissions or call (919) 684-2135.

Deferred Admission. Normally, applicants are admitted only to the class for which they have applied. However, a deferral of admission may be granted for the applicant to gain experience or to strengthen academic qualifications for graduate study or for other valid reasons. Except in unusual circumstances, a deferral of admission cannot be granted for more than one year. Deferrals are granted on individual bases. The small size of each class frequently precludes open-ended guarantees of future admission; however, applicants with substantial reasons for deferring the start of graduate work are encouraged to send a request and a tuition deposit to the director of admis-

sions as soon as possible after receiving an offer of admission. Offers of financial assistance are cancelled upon deferral of admission and students must be reconsidered for financial aid.

Application Deadlines. Application forms and all other information required to complete the application and to allow a student to be considered for admission should be submitted to the Office of Admissions by 15 February for the fall term and by 15 October for the spring term. Although applications submitted after these dates may be considered, early application is recommended because the school receives applications from more qualified students than can be accommodated. All candidates should make arrangements to complete the Graduate Record Examinations well in advance of these deadlines. Applicants seeking financial assistance in the form of scholarships, fellowships, and assistantships for the fall term must have their applications completed no later than 15 February.

Response to Offer of Admission. When admission is approved, the applicant will receive an offer of admission and an acceptance form. A nonrefundable tuition deposit of \$300 is required with acceptance of the offer. The admission process is not complete until the acceptance form and the tuition deposit have been returned to the director of admissions.

Additional Procedures for Foreign Students. Each year the School of Forestry and Environmental Studies welcomes a number of foreign students among its professional and graduate candidates. Applicants from other countries must meet the same criteria as applicants from the United States. All academic transcripts and other documents in support of admission must be accompanied by an official translation if the original document is not in English. The nonrefundable application fee of \$35 (U.S.) must accompany the application. Applicants must have a fluent command of oral and written English. No allowance is made for language difficulty in arranging course schedules or in evaluating performance.

If the native language is not English, the applicant must submit scores on the Test of English as a Foreign Language (TOEFL) to be considered for admission. All arrangements for taking the TOEFL must be made directly with the Educational Testing Service, Box 899, Princeton, New Jersey 08540.

All foreign students whose native language is not English will be tested during their first registration period for competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack necessary competence should be prepared to assume all costs for being tutored in English and should reduce their course or research program by 3 units while being tutored. Students who do not successfully pass the test for competence in the use of oral and written English by the end of their first year of residency will not be permitted to continue their graduate work at Duke University.

Foreign students are not eligible for federal or state loans. The visa-granting authority in the student's country of origin, ordinarily the United States Embassy, requires proof that sufficient funds are available to the student to cover the expenses of all academic years of study before a visa can be granted. Current immigration laws make it extremely difficult for the foreign student to find summer employment and permanent employment in the United States after graduation.

Admission to the Graduate School

Applications for admission to M.S., A.M., and Ph.D. degree programs in forestry and environmental studies should be obtained from and returned to the Dean of the Graduate School, Duke University, Durham, North Carolina 27706. However, initial inquiries and questions concerning fields of study are best directed to the Di-

rector of Graduate Studies, School of Forestry and Environmental Studies. In addition, prospective students are urged to write directly to professors whose research interests match their own to discuss opportunities.

Admission with Nondegree Status

Persons wishing to enter the School of Forestry and Environmental Studies as a nondegree student must submit a special application form calling for nondegree status along with an application fee of \$20. The applicant must have completed a bachelor's degree from an accredited college or university and must submit an official transcript of all previous course work. The Graduate Record Examination is not required although the GRE score is helpful in the admissions process. The student must have one letter of recommendation; this letter should indicate why the applicant should be allowed to undertake nondegree study at Duke. The application itself requires a brief statement of purpose in which the applicant should state his or her reasons for such study at Duke.

School of Forestry and Environmental Studies—(area code 919) 684-2421
Dean's Office—684-2135
Graduate School—684-3913
Department of Housing Management—684-5813
Registrar—684-2813

Financial Information



Tuition and Fees*

The cost of graduate study in the School of Forestry and Environmental Studies at Duke is met primarily from income from endowment, gifts, grants, and research contracts. Substantially less than one-half of the total cost is covered by tuition. In general, the cost of a graduate education of the quality offered by Duke University is modest in comparison with that of other private institutions.

Estimated Expenses for the Academic Year. Certain basic expenditures, such as tuition and housing, are to be considered in preparing a student's budget. The following approximate costs, applicable in 1984-85, are indicative of costs that can be expected.

Tuition (\$236 per unit)	\$7,080
Student health fee (\$90 per semester)	180
Housing	2,450
Food	1,850
Books and supplies	450
Motor vehicle registration	
automobile	30
motorcycle	15
Optional athletic fee	50

In addition to these necessary expenses, the student will incur others which will depend to a large extent upon the tastes and habits of the individual. The average Duke student, however, can plan on a budget of approximately \$13,000 for the academic year. Travel costs, clothing purchases, and other major expenditures are to be added to this estimate. Students with families naturally will have higher expenses.

Payment of Accounts for Fall and Spring. Monthly invoices for tuition, fees, and other charges are sent by the Office of the Bursar and are payable by the invoice due date; no deferred payment plans are available. As a part of the agreement of admission to Duke University, a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied.

Late Payment Charge. If the total amount due on the student invoice is not received by the invoice due date, a penalty charge will be accrued from the billing date. The penalty charge will be at a rate of 1.34 percent per month (16 percent per annum)

*The figures contained in this section are projections and are subject to change.

applied to the *past due balance*. The *past due balance* is defined as the previous balance less any payments and credits received during the current month. Student loan payments, if delayed for reasons beyond the individual's control, are treated as a credit on the student's invoice until the loan payment is received.

Restrictions. An individual will be in default of this agreement if the *total amount due* is not paid by the due date. An individual who is in default will not be allowed to register for classes, receive a copy of the academic transcript, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from the University.

Tuition Refund Policy. In the case of withdrawal from the University, students may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

Withdrawal	Refund
Before classes begin	full amount
During first or second week	80 percent
During third, fourth, or fifth week	60 percent
During sixth week	20 percent
After sixth week	None

Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward. The schedule also applies to housing charges of students moving from University housing to off-campus housing. In the event of death, a full refund of tuition and fees will be granted.

Late Registration. Students who register at a date later than that prescribed by the University must pay a fee of \$25 at the bursar's office.

Audit Fee. Students registered for a full course load may audit courses without charge. Otherwise, audit fees are \$94 per course during fall and spring and one-half of tuition during the summer.

Transcripts. Transcripts are available on request for a fee of \$2, payable in advance, for a single copy. Additional copies to the same address are fifty cents.

Housing Charges. Rent at Town House Apartments is \$1,795 per person in a two-person, two-bedroom unit. Utility charges are not included.

Modular homes rent for \$1,580 per person for a three-person, three-bedroom unit. Utilities are not included.

Central Campus Apartments rents are: \$2,784 for an efficiency; \$2,121 per person in a two-person, two-bedroom unit; and \$1,803 per person in a three-person, three-bedroom unit. Rent includes furnishings and utilities, but it does not include telephones.

Married graduate students may reserve places only in the Central Campus Apartments. Accordingly, they are given priority in these apartments and are charged by the month. The rates range from \$363 to \$498 per month, depending on apartment size and furnishings.

Housing costs are subject to change prior to any academic year. A \$100 deposit is required with all housing applications. This deposit only ensures a place on the housing waiting list and does not ensure any requested residence. The deposit is refunded if there is no room or if the applicant withdraws the application before an assignment is made.

Motor Vehicles. Motor vehicles parked on campus must be registered with the traffic office. Registration must be completed five days after operation on campus begins. The proper registration decal should be displayed on the vehicle. A registration fee of \$30 is charged for each automobile and \$15 for each motorcycle.

The following documents are required to register a vehicle: (1) valid state registration for vehicle registered, (2) valid state operator's license, and (3) satisfactory

evidence of automobile liability insurance coverage with limits of at least \$10,000 per person and \$20,000 per accident for personal injuries and \$5,000 for property damage, as required by the North Carolina Motor Vehicle Law.

Optional Athletic Fee. For the optional athletic fee, the student obtains admission to all regularly scheduled University athletic contests held on the University grounds during the academic year. This fee is payable at the beginning of the fall semester.

Student Health Fee. All students are assessed a fee for the Student Health Service. For the fall and spring, the fee is \$180 (\$90 per semester). For the summer, the fee is \$31 per term.

Tuition and Fees for the Summer Session. Tuition during the 1985 summer session is \$237 per unit (semester hour). The summer student health fee and audit fee are listed above. Further information on fees, housing, policies, and procedures related to the summer session is available from the summer session office, 121 Allen Building.

Financial Assistance

Financial assistance in the form of scholarships, fellowships, or assistantships is available for qualified students pursuing either the professional degrees (M.F. or M.E.M.) or the graduate degrees (A.M., M.S., or Ph.D.). The school is a participant in the Graduate and Professional Student Financial Aid Service (GAPSFAS). All scholarship and fellowship applicants must file application with GAPSFAS. Typically, a student may be offered either a scholarship or fellowship (to defray a part of the tuition) and an assistantship. Applicants may obtain a GAPSFAS form from a college or university counseling and placement center or from GAPSFAS, Box 2614, Princeton, New Jersey 08540.

Scholarships are granted from University funds which are in limited supply. Consequently, only well-qualified students can expect to receive awards. Scholarships are awarded on the basis of demonstrated outstanding academic ability and a high degree of professional promise. Most scholarship funds are awarded to students entering in the fall semester. Scholarships are nontaxable.

Fellowships are obtained from foundation grants, private industry, or individual donors. Donors of fellowship funds sometimes place restrictions on the use of the funds as well as on the amount of awards. Fellowships are awarded primarily to second- and third-year students on the basis of professional promise. Most fellowship recipients are directly involved in one of the academic programs of the school. These awards are nontaxable.

Assistantships are obtained primarily from grant and contract funds awarded to various faculty of the school. In addition, University-funded assistantships are available. Assistantships are awarded to students who have sufficient experience to contribute to one or more ongoing research programs. Assistantships at lower levels of support are awarded to first-year students whereas higher levels of assistantship support are awarded to more experienced second-year students. The Ph.D. candidate can expect to obtain financial support almost exclusively from sources external to the University. Depending on the student's work assignment, assistantships may be taxable.

In all instances, admission to the school is a prerequisite for the award of any form of assistance for the first year of study. Awards are not automatically renewed for the second year of study. Second-year awards are made on a competitive basis and students must reapply in order to be considered for an award.



Eligibility for Financial Assistance

A significant portion of the financial assistance for students in the School of Forestry and Environmental Studies is provided by federal, Title IV funds. To qualify for such funding, usually in the form of assistantships, grants, and loans, students must sign the certificate of compliance regarding Selective Service regulations and must maintain satisfactory progress toward their degree.

The definition of "satisfactory progress" is based upon a combination of length of study in the school, number of units completed, and grades received. The Master of Forestry and Master of Environmental Management degrees must be completed within five years after the first date of matriculation. (Candidates for the A.M., M.S., and Ph.D. degrees should consult the *Bulletin of the Graduate School* for comparable regulations.) During this time, the student must be enrolled for at least 9 units of credit each semester for the first four semesters and at least 3 units of credit per semester thereafter. Regulations concerning grades, stated elsewhere in this bulletin, are applicable.

Failure to maintain satisfactory progress will subject the student to probation or dismissal. A student on probation is ineligible for any form of financial assistance from the school until the terms of probation are removed.

SCHOLARSHIPS

University Scholarships. A limited number of scholarships are awarded each year to selected students who are pursuing either professional or graduate degrees. Awards are made on the basis of academic qualifications and professional or scientific promise. Stipends range from \$600 to \$4,600 for the academic year.

FELLOWSHIPS

Champion International Foundation Fellowship. Fellowships are awarded each year to selected students who are pursuing a Master of Forestry degree. Stipends range up to \$1,500 per year.

W. Horace Corbett Memorial Fellowship. Fellowships are awarded each year to selected master's or Ph.D. degree candidates. Stipends range from \$1,000 to \$3,000 per year for master's degree candidates and from \$2,000 to \$4,000 per year for students pursuing a Ph.D.

Forestry and Environmental Studies Alumni Association Fellowship. A fellowship is awarded each year to a selected student who is pursuing a Master of Forestry or a Master of Environmental Management degree. The student must have completed one year of graduate study. The amount of the fellowship is set at \$1,000 per year.

Daniel H. Gelbert and Associates Consulting Forestry Fellowship. A fellowship is awarded each year to a selected master's or Ph.D. degree candidate interested in the study of nonindustrial private timber holdings. The stipend is set at \$2,000 per year.

Leroy B. George Fellowship. A fellowship is awarded to a selected student from the Haywood or Buncombe counties or the Hendersonville, North Carolina, school systems. Second preference is given to a student from the southern Appalachian region. If a qualified student cannot be identified within the region the fellowship may be awarded to a student in the school who has a demonstrated interest in resource and environmental education and planning. The amount of the fellowship is set at \$1,000 per year.

John C. Glenn Fellowship in Land Resources. Fellowships are awarded each year to selected students pursuing the Master of Environmental Management degree. Stipends range up to \$1,500 per year.

Integrated Case Studies Fellowship. Fellowships are awarded to selected students who present appropriate case study proposals in applied ecology. Stipends range up to \$3,000 per year.

Southwest Forest Industries Fellowship. Fellowships are awarded each year to selected students pursuing a Master of Forestry degree. Stipends range up to \$1,500 per year.

Raymond E. Sullivan Memorial Fellowship. Fellowships are awarded each year to selected students pursuing master's or Ph.D. degrees. Stipends range from \$2,000 to \$5,000 per year for master's degree candidates and from \$4,000 to \$7,000 per year for Ph.D. candidates.

Union Camp Foundation Fellowship. Fellowships are awarded each year to selected students who are pursuing a master's degree in the Center for Resource and Environmental Policy Research. Stipends range up to \$1,500 per year.

Weyerhaeuser Foundation Fellowship. A fellowship is awarded each year to a selected woman or minority student interested in a career in industrial forestry. The stipend is set at \$3,500.

ASSISTANTSHIPS

Graduate Assistantships for the Master's Candidate. Available to both professional and graduate students, these assistantships are particularly suited to the student who is interested in working up to half time during the academic year and full time during the summer. Student assistants are employed to assist members of the faculty with their research and teaching, to assist members of the school staff, and to perform a variety of other functions such as gathering and assembling data on Duke Forest. A few assistantships are available for independent research on various grants and contracts of the school. By the nature of their academic program, particularly of the master's project, some students are able to combine academic study with employment as a graduate assistant.

Graduate assistants are required to work 300, 450, or 600 hours during the academic year. Those employed for 300 hours can expect to work approximately 10 hours per week allowing for University vacation periods. Those employed for 450 hours of service can expect to work approximately 15 hours per week, and those employed for 600 hours can expect to work for approximately 20 hours per week. All levels of service require a regular schedule to be arranged between the student and the faculty member to whom he or she is assigned.

Students employed for ten hours per week are limited to 15 units of credit per semester. Those employed for fifteen hours per week are limited to 12 units of credit, and those employed for twenty hours per week are limited to 9 units of credit per semester. Exceptions require the approval of the student's adviser and the dean. Only those students involved in research for their assistantship and those students involved in independent study or a master's project which is based on the research can expect to maintain an academic load in excess of 9 units.

Stipends for graduate assistantships requiring 300 hours of service range from \$1,700 to \$2,200 depending on the qualifications and experience of the applicant. Students employed for 450 hours may earn from \$2,550 to \$3,300. Students working 20 hours per week may earn from \$3,400 to \$4,400. Depending on the nature of the work assignment, all or a part of the amount may be taxable.

A few graduate assistantships are available during the summer for research and teaching. Up to full-time employment of forty hours per week for a maximum of fifteen weeks is possible. Stipends range from \$1,700 to \$4,400, depending on qualifications and experience.

Graduate Assistantships for the Ph.D. Candidate. Students who are pursuing the Ph.D. may be retained on half-time service (1,200 hours) to the school during the calendar year. Graduate assistants are required to give 20 hours of service per week during the academic year. They may be retained for an additional 40 hours of service per week for fifteen weeks during the summer.

Typically, the Ph.D. candidate is assigned to a member of the faculty to work on a particular research project under his or her direction and/or to provide teaching assistance. Furthermore, the research undertaken is normally a part of the student's graduate program and serves as a basis for the doctoral dissertation. With few exceptions, assistantships are available only for the first two years of graduate study.

Graduate assistants are required to maintain a regular schedule of work as determined by the faculty member to whom each is assigned. Those accepting graduate assistantships will be limited to 10 units of course work per semester. Exceptions require the approval of the major professor and the dean.

Stipends for graduate assistants range from \$6,400 to \$8,800 for a calendar year of service (1,200 hours). Normally, only a small part of the stipend is taxable.

Research Assistantships. Funded from grant and contract research under the direction of various members of the faculty, research assistantships provide support during the latter stages of study of the Ph.D. candidate. Typically, the research assistant completes one or more phases of a research project under the direction of the principal investigator, a member of the faculty. Normally, the research completed forms a substantial component of the requirements of the Ph.D. dissertation. However, in some instances this may not be the case and the students pursue dissertation research in a related area of study.

The level of service required of research assistants depends primarily on the nature of a particular research project and the availability of funds. Normally, research assistants are committed to 600 hours of service during the academic year (20 hours per week). Almost all research assistantships require full-time service for fifteen weeks during the summer. A regular schedule of research under the direction of the principal investigator must be maintained and the academic load is limited to a maximum of 9 units per semester. The research assistant who is retained for half-time service during the academic year and full-time service during the summer may earn from \$6,400 to \$8,800. Usually only a small part of the award is taxable.

Work/Study. Work/study funds are administered for student employment through the dean's office as assistantships. Students in the school are not eligible for work/study jobs administered through the University's placement office and are not awarded work/study funds in financial aid packages. Students who anticipate the need for a work/study position should complete the GAPS-FAS form at the time they accept admission. Jobs are granted to those with established need and with the skill or training required by a professor for a particular type of teaching or research or by a staff member for a particular type of work. It is the responsibility of the student to inquire about jobs with individual faculty or staff and with the dean of the school.

Application for Awards for the Entering Student. Application for awards may be made concurrently with the application for admission. Applicants should initiate the necessary action early to ensure that the required documents are filed with the dean of the school on or before 15 February prior to enrollment. Applicants should:

1. Complete the Graduate and Professional School Financial Aid Service (GAPS-FAS) form, sent on request.
2. Furnish the following documents: (a) official transcripts of all previous college or university credits earned, (b) letters of reference from at least three persons familiar with the applicant's character, scholarship, and professional ability, and (c) scores from the aptitude test of the Graduate Record Examinations.

Applicants should plan to take this examination in October at the latest. Documents offered in support of admission, if so designated, may also serve in support of the application for financial award.

Notification and Acceptance of Awards. Recipients of awards are notified in late March. Completed applications received after the 15 February deadline will be considered if vacancies occur at a later date.

Scholarships, fellowships, and the various categories of assistantships provide the basis for professional/graduate student support. Once offered by the University or the school, funds are committed to one student and are therefore unavailable to others. *As a consequence, it is the policy of the school that all awards offered can be declined prior to 1 April without prejudice. However, offers accepted and left in effect after 1 April are binding for both the student and the school.*

Loans

Applications for loans will be considered after admission and scholarship decisions have been completed. New borrowers must first apply for loans through their state agency or local bank before other types of loans will be considered. The school also participates in the Federally Insured Student Loan (FISL) and National Direct Student Loan (NDSL) programs. Approval of loan requests for monies administered by Duke University is based on financial need and satisfactory scholastic standing. The school will make the decision on the type of loan the student receives—FISL or NDSL.

Applicants for all loans certified or administered by Duke University are required to file the form of the Graduate and Professional School Financial Aid Service (GAPS-FAS). Information and application material for GAPS-FAS can be obtained by writing to Educational Testing Service, Box 944, Princeton, New Jersey 08540.

Applications and complete details regarding the loan programs can be obtained by writing to the school. All applications for loans should be made before 1 July preceding the academic year in which the student plans to matriculate.

State Guaranteed Loans. Most states have established guaranteed loan programs for their own residents. The terms of such loans, the methods of administration, and the availability of funds vary widely among the states. The school will supply information regarding the appropriate agencies to contact in each state and will also make the appropriate certifications of individuals applying for state guaranteed loans. Students requesting such certification must submit the GAPS-FAS form.

Federally Insured Student Loan Program (FISL). A graduate student may borrow up to \$5,000 per year to a maximum of \$25,000, including amounts borrowed during the student's undergraduate years. The interest rate is 9 percent, but the student may qualify for an interest subsidy while still in school through determination of need on the GAPS-FAS report. Six months after graduation or withdrawal from the University, interest and principal payments begin. The student has up to ten years for repayment. In order to be considered for a Federally Insured Student Loan, the FISL application should be completed.

National Direct Student Loan Program (NDSL). Loans through the National Direct Student Loan Program are administered by the University. The funds are allocated to the University under strict federal guidelines on parental income, reasonableness of budget, complete disclosure of assets, and independent status of the student. GAPS-FAS must be submitted. Application may be made for up to \$5,000. Interest on these loans begins to accrue at 7 percent six months after the student graduates or withdraws and repayment begins one month later with up to ten years to repay.

PLUS/ALAS Loan Program. Graduate students are eligible to borrow up to \$3,000 through the federally sponsored PLUS/ALAS loan program. Applications are available through institutions granting the GSL, FISL, or NDSL. The interest rate for these loans may be higher than other federally sponsored loans and interest must be paid from the time the loan is granted. The principal, however, is deferred until graduation. Independent students may obtain the loan, with the only restriction being their ability to repay the interest. Dependent students must have their parents or guardians cosign the loan to guarantee repayment.

Federal Grant Programs. Students with only three years of study at one of the institutions in the Cooperative College Program may be eligible for undergraduate state and federal grant programs. Such students should consult their undergraduate financial aid officers, state loan agencies, or federal granting agencies for applications, requirements, and restrictions.

Short-Term Loans. Short-term loans and emergency funds are available through the Champion Paper Foundation Fund, the E. S. Harrar Fund, the Forestry School Loan Fund, and the University's General Loan Fund. These funding arrangements carry a 9 to 16 percent interest rate. Application for a loan is made at the dean's office. The funds are disbursed by the Student Loan Office on East Campus, which also arranges terms for repayment.

Student Life



Off-Campus Housing

Most of the students at the school join the annual scramble to find a place to live off campus. About one-sixth live in on-campus apartment complexes owned by the University and in the graduate residence halls.

The University is very much a part of the urban environment that is Durham, but the campus is not an urban one. It is not traversed by streets with housing and businesses. Consequently the perimeter of the West Campus is densely developed with apartment complexes, and the East Campus is adjacent to a neighborhood of large early twentieth-century homes, some of which have been converted to apartments. Free bus service is available between the two campuses.

In August and early September, the Department of Housing Management operates an off-campus housing service which consists of a staff person who maintains listings of apartment openings, house rentals, and "roommates wanted." The off-campus housing service does not rate the quality of apartments, houses, or landlords, nor arrange viewings. Similarly, the director of admissions in the School of Forestry and Environmental Studies maintains a listing of houses and apartments popular with students in the school as well as a list of entering students who are interested in finding roommates. These lists are mailed to students during late summer.

University Housing

Town House Apartments. Town House Apartments is a thirty-two-unit complex of one- and two-bedroom apartments which houses single graduate and professional students. The complex is situated between the East and West campuses. Some of the apartments are furnished for occupancy by two single students and the remainder for three single students with two students sharing the large bedroom. Town House Apartments have one and a half baths, a living room, and kitchen with dining area. Students must arrange for and pay for electricity, gas, and telephone. The complex is air conditioned and has a swimming pool, and is easily accessible to the campus bus line. These apartments are available for continuous occupancy, summer months included, if desired.

Central Campus Apartments. In 1974 the University opened a 500-unit complex, the Central Campus Apartments. Units are available for single and married students. For single students, fully furnished one-, two-, and three-bedroom units are available. Apartments for married students include a few furnished efficiencies and one-, two-, and three-bedroom unfurnished units or units in which the living room and first bedroom are furnished. Married graduate students are given priority in these apart-

ments. Because of this and an expected turnover of about 25 percent annually, not all applicants may be accommodated at the time they desire. These units are available for continuous occupancy, summer months included, if desired.

Modular Homes. The University owns six modular homes which are located between East and West campuses. They are reserved for single students. These three-bedroom homes are equipped for three-person occupancy and have proved to be popular. They are usually reserved by students who have occupied other University accommodations during the previous academic year. Students arrange for and pay for electricity and phone.

Application and Residential Deposit. Application forms, housing information, and regulations governing the occupancy of rooms and apartments will be mailed when the Graduate School or School of Forestry and Environmental Studies has notified the Department of Housing Management of official acceptance of the student.

A residential deposit of \$100 must accompany the application form but does not guarantee a space. This deposit is held throughout the term of the original occupancy and any subsequent renewal. In addition to the \$100 residential deposit, a student currently residing in University housing and desiring to reserve accommodations for the next academic year or a shorter period must make a \$100 prepayment of housing fees to the Office of the Bursar. The bursar's receipt must be presented to the Department of Housing Management at the time the application is made. This prepayment is refundable if a student withdraws from the University; has an approved leave of absence prior to 15 August and notifies the Department of Housing Management at that time; or cancels the application on or before 15 July.

Housing fees for single students are payable for an entire semester unless special arrangements to pay on a different basis are made with the University bursar. Married students may make monthly payments as required by the terms of the lease. Housing costs are listed in the Financial Information section.

Additional payments above the rates for the academic year are required for students who must arrive earlier than the dates established for occupancy or remain later than the dates established for vacating University housing.

Roommate matching is done by the Department of Housing Management on the basis of several questions on the application form. Appeals for changing roommates are accommodated at the conclusion of a semester.

Services for Students

Medical Care. The main components of the student health service include the University Health Services Clinic, located in the Pickens Building on West Campus, and the University Infirmary on the East Campus. Emergency transportation, if required, can be obtained from the Duke campus police. The facilities of the University Health Services Clinic are available during both regular and summer sessions to all full-time students. The facilities of the University Infirmary are available only from the opening of the University in the fall until graduation day in the spring to all currently enrolled full-time students.

To secure the benefits of the student health service, a graduate student, during the term or semester in which the illness occurs, must (1) in the summer session term be registered for at least 1 unit of research or 3 units of course work; (2) be registered for at least 9 units per semester. The costs of student health benefits have been borne by tuition in the past, but are now separate and can be identified as a medical expense for tax purposes. The student health fee is nonrefundable after the first day of classes. Students are not covered during vacations, and their dependents and members of their family are not covered at any time.



The resources of the Medical Center are available to all students and their spouses and children. Charges for all services received from the Medical Center are the responsibility of the student.

The University has an Accident and Sickness Insurance Plan available for full-time students. Although participation in this plan is voluntary, the University expects all graduate students to be financially responsible for medical expenses above those covered by the student health service. Students who have medical insurance or wish to accept the financial responsibility for any medical expense may elect not to join the Accident and Sickness Insurance Plan by signing a statement to this effect. Each full-time student in residence must purchase this student health insurance or indicate the alternative arrangement.

The Student Accident and Sickness Insurance Plan provides protection twenty-four hours a day during the twelve-month term of the policy. Students are covered on and off the campus, at home, while traveling, and during interim vacation periods. For additional fees a student may obtain coverage for a spouse or spouse and children. Term of the policy is from opening day in the fall.

Coverage and services are subject to change as deemed necessary by the University.

Counseling and Psychological Services. CAPS provides a comprehensive range of counseling and psychological services to assist and promote the personal growth and development of Duke students. The professional staff is composed of clinical social workers, psychologists, and psychiatrists experienced in working with young adults. Among services provided are personal, social, academic, and career counseling. A number of short-term seminars or groups focusing on skills development and special interests such as coping with stress and tension, fostering assertiveness, enriching couples' communication, and dealing with separation and divorce are also offered. A policy of strict confidentiality is maintained concerning each student's contact with the CAPS staff. Individual evaluation and brief counseling/therapy as well as career and skills development seminars are covered by student health fees. There are no additional charges to the student for these services.

Appointments may be made by calling 684-5100 or visiting CAPS, 214 Old Chemistry Building.

Office of Placement Services. The Office of Placement Services, 214 Flowers, acts as a liaison between the University and potential employers. Students who wish to register with the office are offered an opportunity to assemble a dossier of academic records and recommendations in preparation for interviews and to have a permanent file for future reference. Interviews with representatives from industry and government are scheduled throughout the year for those students who have registered with the placement office. All services are offered without charge to students and alumni. In addition, the school maintains its own Office of Student Placement, 207 Biological Sciences. For further information, see the Placement section in this bulletin.

International Adviser. The International Office handles governmental matters for students from abroad such as statements of attendance for home governments, issuance of United States immigration forms for re-entry into the country after a temporary absence, and required yearly extensions of time. Any new student who is not a citizen of the United States should report with passport to the international adviser soon after arrival. The International Office is located on East Campus, 210-A East Duke.

Other Services. The Bryan University Center houses an information desk, two drama theaters, a film theater, stores for books and supplies, meeting rooms, lounges, snack bars, and other facilities. A barbershop, hairdresser, post office, and bank are also located in the center and in the nearby West Campus Union.

Student Organizations and Activities

Sports. Students are welcome to use such recreational facilities as the swimming pools, tennis courts, golf course, track, jogging course, handball and squash courts, gymnasias, weight room, and playing fields. Intramural programs provide an opportunity to participate in informal and competitive physical activity. A variety of clubs for gymnastics, scuba diving, sailing, cycling, badminton, karate, rugby, soccer, and crew are also active.

FOREM. The FOREM Club is the student organization for coordination of the school's social functions and intramural team participation. Annual functions of the club include a Christmas party, Christmas tree sale, Field Day, and year-end banquet.

Student Advisory Committee. The Student Advisory Committee, an elected student group, meets regularly with the dean and faculty representatives to offer advice on courses and curriculum, programs, and long-range goals of the school.

Professional and Scientific Societies. Students are encouraged to participate in one or more professional or learned societies appropriate to their academic interest. Most of these societies are highly interested in participation by students. Not infrequently a lower fee is established to encourage student membership. Some learned societies which might be considered for membership include American Association for the Advancement of Science, American Institute of Biological Sciences, American Economics Association, American Meteorological Society, American Phytopathological Society, American Society of Plant Physiologists, American Statistical Association, Ecological Society of America, and the Entomological Society of America. The Society of American Foresters, American Institute of Planners, the American Fisheries Society, and the Range Society are examples of typical professional societies which students might consider for membership. A student chapter of the Society of American Foresters is active in the school.

Religious Services. Interdenominational services are conducted on Sunday mornings in Duke Chapel. Roman Catholic masses are offered daily on campus. Several Protestant denominations have student centers on campus. The Divinity School conducts other chapel services and religious and social activities. There is also a Hillel group which meets regularly.

Cultural Activities. Concerts, recitals, lectures, plays, films, and dance programs are presented frequently on campus. Information on major events is available at Page Box Office or the Bryan Center information desk. The University Museum of Art, which has some excellent permanent collections, is located on East Campus.

Academic Regulations



Planning

The responsibility for the specific content of the academic plan of study rests with the student. A thorough familiarity with and understanding of the regulations contained in this bulletin as well as other sources provided by the school are essential to sound planning.

During the fall term each student is assigned a permanent faculty adviser. The adviser should be consulted in planning a course of study. Other members of the faculty, particularly those concerned with the plan of study, should also be consulted on an informal basis. Reassignment to another adviser can be obtained, but only by written request to the dean.

Registration

Entering students who register for the Master of Forestry or Master of Environmental Management degree will receive instructions by mail from the School of Forestry and Environmental Studies a few weeks before the start of the fall term. Registration should be completed during the orientation week. Students in residence register for succeeding semesters at times scheduled in the University calendar.

Registration is approved by the adviser and processed by the school's director of admissions and by the University bursar. Registration is required in order to take courses for credit or audit. To establish eligibility for University housing, for University loans and some outside loans, for the student health service, and for study and laboratory space, a student must be registered. All tuition and fee payments and any indebtedness must be settled before registration will be completed.

Late Registration. All students should register at the times specified by the University. The charge for late registration is \$25.

Change of Registration. With approval of the adviser, the student can change registration for a period of ten days following the close of registration. A change of fees requires completion of a new fee sheet which is obtained from the school. *All changes of fees must be made on the first day of the ten-day change period.*

Refunds. Tuition refunds are governed by the policy stated in the chapter on Financial Information.

Graduate School Registration. Students in A.M., M.S., or Ph.D. degree programs register through the director of graduate studies of the Department of Forestry and Environmental Studies. Registration requirements and procedures are described

in the section on graduate degrees of this bulletin and in the bulletin of the Graduate School.

Reciprocal Agreements. Students enrolled full-time in the School of Forestry and Environmental Studies or in the Graduate School during the regular academic year may be admitted to a maximum of two courses per semester at the University of North Carolina in Chapel Hill, North Carolina State University in Raleigh, or North Carolina Central University in Durham. Similarly, graduate students in these schools may take up to two courses per semester at Duke. Students may also take summer courses at one of the reciprocating universities; however, they must also be registered for at least 1 unit of summer credit at Duke.

Courses

Course Descriptions. All courses currently offered by the school are described in the final section of this bulletin. A list of courses to be offered during a particular term, as well as schedules of courses offered in other departments at Duke and at neighboring universities, are available from the director of admissions prior to registration for that term.

Independent Study. All students are expected to place increasing emphasis on independent study as they near completion of residence. FES 299 lists a number of independent project areas. Several students can work together under the supervision of a faculty member by registering for FES 200.

Master's Project. All students must complete a master's project of 4 to 8 credits. The project should be identified during the first term of study and initiated during the second term. No student will be permitted to register for the third term of study until a project proposal has been approved by the student's adviser and has been received in the dean's office. During the final two terms major emphasis should be placed on the project. In completing the project, the student applies theoretical and analytical training acquired during the two years of study on actual natural resource or environmental problems. If desirable, arrangements can be made by the student or the school for consultation with other organizations concerning the scope and objectives of the project.

Students maintain close contact with their advisers during the development and writing of the master's project. Projects should reach final stages of completion by midterm of the final semester in residence. *One copy of the project, approved by the adviser, must be delivered to the dean's office by 1 November for those graduating in December, by 1 April for those graduating in May, and by 1 August for those graduating in September.* The adviser is responsible for critical assessment and grading.

Auditing. Students registered for a full course load may audit courses free of charge. Otherwise, the audit fee is \$92 per course during the fall and spring and one-half of tuition during the summer. Written permission of the instructor prior to registration for the course is required. Audited courses must be so indicated on the registration card. In classes where enrollment is limited, students enrolled for credit will receive priority. Audited courses are recorded without grade on the student's permanent record card. Regular attendance is expected. Changes from audit to credit are not permitted after the drop/add period.

Dropping and Adding. The period for dropping and adding courses is limited to the first ten calendar days of the fall and spring semesters. During the summer, dropping or adding of courses is limited to the first three days of the term. Students are advised to make all class changes on the first day of class if at all possible. *Except under unusual circumstances, and with special permission of the dean, no reduction of tuition and fees is permitted unless classes are dropped on the first day of the drop/add period.*



For the special intensive courses, registration may be changed from one intensive course to another course of equal credit after the close of the drop/add period. However, there may be no change in the number of semester hours or in fees.

Retaking Courses. Courses required as a part of the program elected by the student or required by the adviser must be retaken if failed. Courses prerequisite to more advanced courses the student wishes to elect must be retaken if failed. Elective courses may be retaken if the student wishes to do so. See the section on grades, below, for additional information.

Credit Hours

Students are considered fully registered when they enroll for the number of credits their programs require. Required registration is set in consideration of the student's obligation to teach or assist and of the student's progress toward fulfilling degree requirements. In the academic year, maximum registration for the resident student who does not hold an appointment as a graduate or research assistant and does not engage in part-time work is 15 units a semester or 30 units an academic year. The registration for resident students who hold such appointments or undertake such work is either 12 or 9 units, depending on the number of hours per week they are required to devote to such duties.

A full semester load of 15 units normally consists of a combination of regular courses, independent projects, and the master's project for not more than 13 units, plus 2 units of seminars or modular courses. No more than four regular courses can be taken in a semester. Permission of the dean is required to take more than 15 or less than 9 units in a semester.

Transfer Credit. Students enrolled in a full-time degree program may transfer up to 6 units of credit completed in a graduate degree program at an institution other than Duke University or one of the Research Triangle reciprocal agreement universities. The credits must be upper division or graduate level course work with a grade of at least *G* or equivalent. A transcript must be sent to the school with a request to the dean for transfer credit.

Summer Registration. Students who are in residence during the academic year and wish to continue to study and to use University facilities during the summer, including the student health service, must register for 1 unit in the first summer session term. This registration provides use of facilities for both terms of the summer session.

Registration in Residence Versus Registration in Absentia. A resident student who has completed all requirements except the master's project must register for 3 units of credit each semester during the regular academic year until all degree requirements are met. A student who decides to go out of residence (away from the University) may register for 1 unit of credit in absentia with permission of the dean. A student working toward a degree must be registered either in residence or in absentia each fall and spring semester until completion of the degree. Only under extreme circumstances (serious problems of health) may this requirement be waived.

Grades

The grading system used in the School of Forestry and Environmental Studies and the Graduate School is as follows: *E* (exceptional); *G* (good); *S* (satisfactory); *F* (failing); *I* (incomplete); *Z* (continuing).

The grades of *P* (pass) and *F* (fail) are used in the School of Forestry and Environmental Studies for seminars and modular courses. At the instructor's option, the grades of *P* or *F* or regular letter grades are used for intensive courses, independent projects,

and master's projects. The grade of *Z* is assigned for an independent project or a master's project which extends over a period of more than one semester; a final grade is given upon completion of the project. Credit hours for a course completed on a pass/fail basis are creditable toward the master's degree as long as the course is not required in the student's major area of study. Permission for the pass/fail option must be obtained in writing from the instructor upon registration for a course.

Incomplete Grades. A grade of *I* indicates that some portion of the student's work is lacking, for an acceptable reason, at the time grades are reported. Requirements of all courses in which a grade of Incomplete is assigned by an instructor must be fulfilled within one calendar year following the date of the assignment of the incomplete grade. If the student fails to complete the requirements within one calendar year, the *I* grade will be changed to a grade of *F*.

In exceptional circumstances, upon recommendation of the professor who assigned the grade of Incomplete, the faculty council may extend the time for completion of the course requirements. If, in the judgment of the professor and the student's adviser, completion of the requirements is not a reasonable alternative for the student, the student may petition the faculty council to allow the grade of *I* to stand permanently on his or her record. Action to allow the *I* to stand permanently must be initiated prior to the time that a grade of *F* is recorded (i.e., within one calendar year). No student will be allowed to graduate with an Incomplete unless permission has been granted for it to stand permanently on the record.

Academic Honors. A student who is registered for at least 9 units and who achieves a superior academic record consisting of all *Es* is eligible to be named to the dean's honor list for that semester.

Students who have achieved a superior academic record for all courses taken in residence may be eligible for graduation with honors or with highest honors. Faculty approval is necessary for graduation with honors. Factors considered in addition to academic achievement are professional promise, participation in student and academic extracurricular affairs, and the quality of the master's project.

Failure. Any course for which a failing grade is received must be retaken or replaced with a substitute course. A substitute course requires the approval of the student's adviser and the faculty council. Both the original failing grade and the grade received for the retaken or substitute course will appear on the student's transcript. Failure of a course also subjects the student to dismissal (see the sections on probation and dismissal and automatic dismissal).

Probation and Dismissal. Students are subject to dismissal from the school under any one or a combination of the following factors:

1. no grades higher than *S* during the first semester of study;
2. less than 6 units of *G* and/or *E* grades during the first full year of study;
3. a grade of *F* in any course at any time.

An appeal may be submitted through the adviser to the faculty to continue study under a probationary status. Probationary terms, set by the adviser, must be specific in the appeal and the appeal must be approved by the faculty. If probationary terms are met, the student will be returned to regular status. If probationary terms are not met, the student will be dismissed. Students will not be awarded degrees while on probationary status.

Automatic Dismissal. A student is automatically dismissed upon failure of more than one course.

Academic Irregularities

All cases falling outside the regular policies and procedures of the school are referred to the faculty council for decision. The work of the council includes review and decision regarding course requirements for graduation, student probation and withdrawal, student petitions for waivers of degree requirements, and all actions which deviate from established academic regulations.

A student who desires to petition the council should do so in writing to the chairman. A precise statement of the reason for the request is required. The student will be notified in writing of the decision of the council by the chairman.

Transcripts of Credit

A student who is registered for a course and who successfully completes the requirements as prescribed by the instructor receives credit on the records of the school. Official transcripts of credit are issued only by the University Registrar, 103 Allen Building. Requests for transcripts, sent directly to the registrar, should state clearly the full name under which the work was taken, the dates of attendance, and to whom the transcripts are to be sent. The student must sign the request for release of a transcript. The cost of a single transcript is \$2, payable in advance. Additional copies to the same address are 50¢ each. No transcripts will be issued for students who fail to clear all financial obligations to the University upon graduation.

Length of Study

For a full-time student entering without an undergraduate degree in forestry or environmental studies, the normal time for completing the master's degree is four semesters. No student, either full-time or part-time, is allowed more than five years to complete the requirements for the master's degree.



Withdrawal

A student is required to be registered each semester of each academic year either in residence or in absentia until all degree requirements are satisfied. A student is considered to be working toward a degree until he or she submits in writing a formal request to the dean. The petition must state the reasons for withdrawal and the projected time of departure from the University. Until formal notice of withdrawal is accepted by the dean or the student completes the degree, a registration card for each semester of the academic year for up to three years will be prepared to register the student in absentia. The student will be required to pay for such registrations and any resulting late fees even if the student later withdraws from the University. Such bills and their collection will be under the authority of the University bursar.

Application for the Degree

Even if degree plans are tentative, a candidate for a degree must file an application for the degree no later than the end of the sixth week of the semester in which the degree is to be received. For a degree to be awarded in September, application must be filed no later than the beginning of the second summer session. The application for the degree is valid only for the semester in which it is filed. If the student does not receive the degree as expected, he or she must file a new application.

All candidates are urged to attend the commencement exercises at which their degrees are to be awarded. A student who is unable to attend is required to file a petition with the dean, not later than four weeks prior to commencement, seeking permission to receive the degree in absentia.

Debts

Students are expected to meet all financial obligations to the University prior to completion of the degree. Failure to pay all University charges by the due dates specified by the University will bar the student from registration, class attendance, receipt of transcripts, certification of credits, leave of absence, or graduation until the account is settled in full. Further, an individual in default may be subject to withdrawal from the University.

Courses of Instruction



Introductory Courses

191, 192. Independent Study in Forestry and Environmental Studies. Directed reading and research. Open to qualified students in junior and senior years by consent of the student's department in Trinity College and of the School of Forestry and Environmental Studies. Units to be arranged. Fall, spring, summer. *Staff*

194. Conserving Natural Resources. Fundamentals of natural resource development, use, management, and protection based on principles of the natural and social sciences. Open only to undergraduates. 3 units. Spring. *Royer*

Forest Resources

203. Silvics. Identification, classification, distribution, and ecological characteristics of North American forest tree species. Life history as it pertains to reproduction and response to environmental and competitive stress. Wood characteristics that affect utilization. 2 units. Fall. *Staff*

204. Forest Inventory, Growth, and Yield. Measurement of land and forests for purposes of management, appraisal, purchase, and sale. Techniques for predicting the growth and future yield of stands by various methods. 3 units. Fall. *Davis*

205. Silviculture. Consideration of the decision-making process by which prescriptions are formulated for regeneration, tending, and harvesting of forest stands. Biological factors underlying stand manipulation are stressed and economic, harvesting, and utilization variables are discussed as appropriate. Emphasis on principles and techniques that transcend vegetation types or geographic regions. 4 units. Spring. *Davis*

207. Forest Pest Management. Fundamentals of entomology and plant pathology as appropriate to understanding the impacts of insects and diseases on forest productivity and their assessment for integration into forest management. Regional case examples and complexes are evaluated in terms of pest-population, forest-stand dynamics; economic and societal constraints; treatment strategies; monitoring systems; and benefit-cost analysis. This approach seeks to develop predictive capabilities in long-range pest management and decision making. Laboratory is largely field oriented to focus on diagnostics and impact analysis. 3 units. Fall. *Stambaugh*

208. Fire Behavior and Use. Impacts of destructive agents upon forests; principles of combustion, fire behavior, danger measurement and suppression; use of fire in forest management. 3 units. Spring. *Staff*

209. Forest Entomology. Identification, biology, and control of insects that cause damage to trees and wood products. Emphasis of diagnosis is based on the characteristics of the damage and the stages of the insects responsible. Prerequisite: consent of instructor. 4 units. Spring. *Staff*

210. Forest Pathology. Diseases of North American forests and their timbers, with emphasis on current literature and management strategies. Field and laboratory diagnosis. 3 units; 4 units with laboratory. Spring, even-numbered years. *Stambaugh*

221. Forest Soils. Introduction to soil resources and the interactions of forest production, management, and soil fertility. Topics include soil chemistry, physics, development, and nutrient cycling, all from the perspective of maintaining and improving forest productivity. 3 units. Spring. *Binkley*

301. Forest Nutrition Management. Basic processes of soil chemistry and ecosystem nutrient cycling as regulators of forest production. Management impacts such as fertilization, fire, harvest, and biological nitrogen fixation. Laboratories include methods of determining site fertility, assessing forest productivity, and using computer simulation models to guide management decisions in forest nutrition programs. 4 units. Spring. *Binkley*

304. Forest Yield. Productivity of forest trees and stands, particularly as a function of silvicultural manipulation; analysis of stand responses such as growth rate, stem form, tree quality, product quality, and value. One or more growth models are assessed for biological reality and usefulness to forest managers. Prerequisite: 205. 2 units. Spring, even-numbered years. *Davis*

308. Tree Biology. Life processes and properties of trees, including anatomy, physiology, and chemistry. Focuses on the tree as an integrator of ecological site factors in the production of value from the forest. 2 units. Spring. *Staff*

309. Forest Regeneration. Natural and artificial means of creating new forest stands of desirable quality and stocking. Biological, economic, and technical factors are considered. Prerequisite: 205. 2 units. Fall. *Davis*

310. Forest Productivity and Mineral Cycling. An ecosystem approach to studying the processes affecting productivity and mineral cycling in the world's forests. Emphasis on primary production, biomass accumulation, and biogeochemical cycling as affected by edaphic and climatic conditions. Concepts of ecosystem analysis and research methodology are stressed. Prerequisite: consent of instructor; course work in plant physiology, soils, and statistics is recommended. 3 units. Spring, even-numbered years. *Richardson and Binkley*

322. Microbiology of Forest Soils. Ecology of the microbial populations of forest soils, with emphasis on rhizosphere interactions, root pathogenesis, and mycorrhizae. Prerequisite: consent of instructor; mycology and bacteriology are recommended. 4 units. Spring, odd-numbered years. *Stambaugh*

328. Forest Soil Fertility. Relationships of soil fertility factors to the growth of forest stands. Soil chemical properties and biological processes affecting mineral nutrition of trees. Soil amendment practices, including forest fertilization and land disposal of municipal wastes. Laboratory analysis of chemical composition of soil, water, and plant tissue samples. Prerequisite: 221. 4 units. Spring. *Staff*

Resource Ecology

211. Applied Ecology and Ecosystem Management. An application of ecological principles to applied resource and environmental problems with an emphasis on the ecosystem as a basic working unit. Perspectives include such topics as land/water

interactions, the patchiness concept, succession, energy flow, productivity, mineral cycling, perturbation effects on ecosystems, and limiting factors. Laboratory studies will focus on the team approach to analyzing the biotic and abiotic components of the ecosystem and impact analysis. 4 units. Fall. *Richardson*

212. Ecosystem Dynamics in Forest Productivity. Information about forest ecosystems is quantitatively integrated with silviculture to form a decision and control process for producing biologically possible combinations of benefits. Timber, cash flow, wildlife habitats, streamflow, recreation opportunities, and other benefits are assessed singly and in combinations. Principles of cybernetics and system dynamics are used. 3 units. Fall. *Boyce*

213. Forest Ecosystems. Introduction to the environmental and biotic processes and integration of these processes into ecosystem patterns. Extensive use is made of case studies and microcomputer simulation models to illustrate dynamic interactions of ecosystem processes. Elective laboratory, taught as FES 214, introduces field aspects of forest ecology. 3 units. Fall. *Binkley*

215. Environmental Physiology. Examination of the concepts of tolerance, limiting factors, bioenergetics, nutrition, stress physiology, homeostasis, and alleopathy for both plant and animal life. Discussion of procedures for and examples of monitoring physiological perturbations due to resource manipulation. 2 units. Spring. *Richardson and Di Giulio*

216. Applied Population Ecology. Discussion of population dynamics of natural and exploited populations. A quantitative approach with an emphasis on mathematical models and their application to population problems. 2 units. Spring, even-numbered years. *Staff*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. Offered at the Duke Marine Laboratory, Beaufort, North Carolina. 6 units. Summer, term 1. *Godfrey*

311. Ecological Toxicology. Study of environmental contaminants from a broad perspective encompassing biochemical, ecological, and toxicological principles and methodologies. Emphasis on sources, environmental transport and transformation phenomena, accumulation in biota and ecosystems, and impacts at various levels of organization. Prerequisites: general ecology and vertebrate physiology or consent of instructor. 3 units. Fall. *Di Giulio*

312. Wetlands Ecology. The study of bogs, fens, marshes, and swamps. Emphasis on processes within the ecosystem: biogeochemical cycling, decomposition, hydrology, and primary productivity. Ecosystem structure, the response of these systems to perturbations, and management strategies are discussed. A research project is required. Prerequisites: 211 or equivalent and consent of instructor. 3 units. Spring, odd-numbered years. *Richardson*

314. Integrated Case Studies in Toxicology. Students are assigned topics relative to their chosen research discipline in toxicology and are asked to develop case studies to present at a roundtable workshop. Emphasis on review and analysis of toxicological problems from a holistic (multidisciplinary) viewpoint. 1 unit. Spring. *Richardson or Di Giulio*

317. Applied Ecological Problem Solving. Workshop in organizing, conducting, and presenting management-oriented ecological research. Students work in groups to collect and analyze information needed to solve a local resource management prob-

lem. Goal-setting, network analysis, decision analysis, statistics, and simulation are used. Prerequisites: course work or experience in ecology, statistics, computer programming, and simulation or consent of instructor. 4 units. Spring. *Maguire*

318. Seminar in Ecotoxicology. Discussion of current topics concerning environmental contaminants. Individual students review a chosen topic and lead subsequent discussion. Guest speakers. 1 unit. Spring. *Richardson and Di Giulio*

319. Seminar in Natural Resource Ecology. Discussion of current ecological and environmental problems and research topics related to the management of natural resources. 1 unit. Spring. *Staff*

320. Seminar in Integrated Case Studies in Natural Resource Analysis. Examination and analysis of the integrated case study for solving resource and environmental problems. Prerequisite: consent of instructor. 1 unit. Offered on demand. *Richardson*

Water and Air Resources

230. Weather and Climate. Overview of the science of meteorology and principles of climatology, especially as applied to problems in ecology and natural resource management. Emphasis on the processes and characteristics of weather phenomena and local and regional climates. General introduction to sources of climatic data and climatic data analysis. Includes laboratory. 4 units. Fall. *Knoerr*

231. Environmental Climatology. Applications of climatology to solving problems in the areas of applied ecology; land use planning; forest, water resource, and air quality management. History of the atmosphere and world climates is considered to provide a perspective on current conditions. Impact of weather on human behavior, property, and natural resource management. 3 units. Spring. *Staff*

232. Microclimatology. Introduction to the micrometeorological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. 3 units. Spring, odd-numbered years. *Knoerr*

234. Watershed Hydrology. Introduction to the hydrologic cycle with emphasis on the influence of land use, vegetation, soil types, climate, and land forms on water quantity and quality and methods for control. Development of water balance models. Analysis of precipitation patterns, rainfall and runoff, and nonpoint source impacts. Statistical handling and preparation of hydrologic data, simulation and prediction models, introduction to groundwater flow, laboratory and field sampling methods. 4 units. Fall. *Marin*

236. Water Quality Management. Types, sources, and effects of pollutants. Water quality standards and criteria. Engineering approaches to water management. Mathematical models and their application to water quality management. Federal regulations, in particular, the Federal Water Pollution Control Act amendments of 1972 and 1977. Economic and policy analysis for water quality management planning. 4 units. Fall. *Reckhow*

237. Watershed Modeling and Management. Analysis of models for individual hydrologic processes. Evaluation of management-oriented watershed models based on the hydrologic process models. Simulations with watershed models as a basis for management decision making to optimize water yield quantity, timing or quality under various vegetative, climatic, topographic, and soil conditions. Prerequisite: 234. 3 units. Spring. *Knoerr and Marin*

330. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air

resources. Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Includes laboratory. 4 units. Spring. *Knoerr*

331. Water Resource Systems. Introduction to the fundamentals of water resource systems planning and management. Emphasis on optimization, simulation, statistical, and economic principles for management of surface and subsurface water resources. Topics include project selection and evaluation, design of standards and regulations, stochastic and deterministic quantity/quality simulation models, water supply and waste water treatment technologies, decision and risk analysis. 3 units. Spring. *Marin*

332. Air Quality Management and Modeling. Types and sources of atmospheric contaminants including effects of industry, urban development, farming and forestry practices, and recreation. Meteorological effects on air quality. Determination of air quality trends and the application of management systems from a meteorological point of view. Types and applications of air quality models. Performance of air quality models under various emission sources, meteorological, and topographic conditions. 3 units. Fall. *Staff*

338. Micrometeorology and Biometeorology Seminar. Advanced topics in the physics of the earth's surface environment, with emphasis on plant and animal microclimates; budgets of mass, momentum, and energy; vertical structure of wind, temperature, water vapor, and carbon dioxide in relation to exchange processes within the biosphere. Prerequisites: 232 or equivalent and consent of instructor. 2 units. Offered on sufficient demand, either fall or spring. *Knoerr*

339. Seminar in Water Quality Modeling. Study of existing water quality simulation models using sensitivity analysis and experimental design. 1 unit. Spring, odd-numbered years. *Reckhow*

Quantitative Methods

251. Natural Resource Data Analysis. Elements of statistical inference and estimation including exploratory data analysis, regression, analysis of variance. 3 units. Fall. *Staff*

302. Models in Forest Productivity. An overview of models used in forest productivity management and research, ranging from stand growth and yield to forest ecosystem models. Students learn how to choose appropriate models for management and research, use them and analyze the results, evaluate their validity and utility, and interpret models used by others. Half course (second half). 2 units. Fall. *Staff*

350. Statistical Estimation and Inference for Resource Management. Regression analysis with nonexperimental data, simultaneous equations, time series analysis using Box-Jenkins methods. Emphasis on natural resource management applications and inferences for policy evaluation and planning. 4 units. Spring. *Reckhow*

352. Matrix Methods for Resource Systems. The algebra of matrices: addition, subtraction, multiplication, and matrix inversion. Solution of simultaneous equations. Partitioning, transformations, eigenvectors, and eigenvalues. Application to diffusion processes, statistical methods and population dynamics. Half course (first half). 2 units. Spring. *Jayne*

353. Analysis of Resource Systems. Introductory survey of linear and nonlinear difference and differential equations important in resource management and environmental decision making. Graphical, analytic, and numerical methods of solution, de-

termination of equilibrium and stability, oscillatory and chaotic systems, boundary value problems. Prerequisite: consent of instructor. 3 units. Spring. *Staff*

355. Optimization Methods for Resource Management. Introductory survey of optimization techniques useful in resource management and environmental decision making. Numerical techniques for unconstrained optimization, linear programming, dynamic programming, and optimal control methods. Prerequisite: consent of instructor. 3 units. Fall. *Staff*

Resource Management

261. Remote Sensing for Resource Management. An examination of remote sensing systems as sources of information in resource management with an emphasis on aerial photography and multispectral scanners. Emphasis on the interpretation of airborne and space imagery. 3 units. Spring. *Davison*

263. Harvesting and Transportation Systems. Analysis of cable, tractor, and aerial harvesting systems. Sawlog and pulpwood transportation. Emphasis on material flow, inventory control. Application of simulation and optimization methods to harvesting, loading, and transport. 3 units. Spring. *Jayne*

264. Manufacturing Systems. Study of material processing in sawmills, pulp-mills, plywood plants, and composite board manufacturing facilities. Emphasis on material flow, quality control, inventory control. Application of quantitative methods and economic analysis to forest product manufacturing operations. 3 units. Fall. *Jayne*

267. Wildland and Wildlife Management. Overview of wildlife management in relation to land use, properties of wildlife populations, elements of game range, manipulation of food and cover, agencies involved in wildlife conservation, and the role of public and political involvement. 3 units. Spring. *Staff*

305. Harvesting Effects on Productivity. Impacts of harvesting on the residual stand, soil properties, water quality, and future site productivity. The integration of harvesting into overall stand management through a full rotation is stressed. Half course (first half). 2 units. Fall. *Staff*

361. Forest Resource Management. Principles of organizing forest properties for systematic management; use of data obtained in surveys and inventories; principles of forest regulation, including a study of normal and actual forests, rotations, cutting cycles, and methods of regulating the cut in even-aged and all-aged forests for sustained yield; introduction to the preparation of preliminary forest management plans. 2 units. Spring. *Staff*

367. Seminar in Forest Resource Management. Examination and analysis of techniques employed in the management of industrial and public forests, particularly in the South; discussion of problems of large-scale intensive forest management. Prerequisites: 205 and 361 or equivalents. 1 unit. Fall, spring. *Staff*

Resource Economics and Policy

270. Resource Economics and Policy. The application of economic concepts to private and public sector decision making concerning natural and environmental resources. Investment analysis, benefit-cost analysis. Planning and policy concepts. Prerequisite: introductory course in economics. 4 units. Spring. *Hyde*

372, 373. Advanced Natural Resource Economics. Survey of advanced topics in natural resource and environmental economics. Emphasis on renewable resources and public policy. Prerequisite: consent of instructor. Two courses, 3 units each. Fall and spring. *Hyde*

377. Seminar in Natural Resource Allocation and Efficiency. Evaluation of economic principles concerned with problems of natural resource allocation, with special attention to the alternatives for governmental policies in private property economics. Prerequisite: consent of instructor. 1 unit. Fall, even-numbered years. *Staff*

283. Environmental Policy and Values. Discussion of varying philosophical approaches to the allocation and use of natural resources and the environment. Views espoused by ecologists, preservationists, naturalists, conservationists, economists, planners, theologians, lawyers, and political scientists are considered. Through extensive readings, students consider who values what in society, and who gets what, when, and how. Prerequisite: consent of instructor. 3 units. Fall. *Royer*

381. Natural Resource Policy. An examination of institutions and processes in the public sector that influence natural resource allocation and use of the environment. Emphasis on political allocation of resources, especially legislative and administrative processes. Current natural resource and environmental policy is briefly surveyed. Prerequisite: consent of instructor. 3 units. Spring. *Royer*

385. Decision Theory and Risk Analysis. Bayesian decision theory, including conditional probability, subjective probability, utility theory, value of sample information, and multiattribute problems. Behavioral decision theory. Applications of decision theory in resource and environmental policy making. Prerequisite: 251 or equivalent. 2 units. Spring. *Reckhow*

388. Seminar in Resource and Environmental Policy. Discussion of the political, legal, and socioeconomic aspects of public and private action in environmental quality control and management. Prerequisite: consent of instructor. 1 unit. Fall, spring. *Staff*

Intensive Courses

214. Ecology of Southern Appalachian Forests. One-week introduction to forest ecosystems in the southern Appalachians, including species identification, major forest types, patterns in ecosystem distributions, and effects of human activities. 1 unit, intensive. Fall. *Binkley*

252. Computer Applications for Forest Managers. Overview of the applications of computer technology to problems in forest management. Review of hardware and software capabilities, procedures for planning and implementation, practical applications in forestry operations. 1 unit, intensive. Spring. *Vasievich*

258. Forest Appraisal. Presentation of the principles of real estate appraisal as they apply to valuation problems in forestry. Consideration of appraisal theory, accounting and tax concepts in forest land management. Application of financial analysis techniques to forest land management through lectures and problem-solving sessions. 3 units, intensive. Fall. *Sizemore*

262. Forest Utilization. Introduction to utilization in the managed forest and the principal wood-using industries. Taught as a one-week field seminar. May be taken by nonforestry majors. 1 unit, intensive. Spring. *Staff*

280. Economics in Forest Planning and Program Implementation. The role of economics in planning in public and private forest organizations. Emphasis on analysis of goals to develop decision criteria for budget formulation and project selection. 1 unit, intensive. Fall. *Row*

288. Forest Taxation. Review of the principles of timber taxation as applied to forest management, including income (capital gains), estate and property taxation. Types of timber transactions discussed include outright sales, cutting contracts, and leases. Proper treatment of expenses, depletion basis, and casualty losses are consid-

ered. Emphasis on solution of practical problems using actual reported cases. 1 unit, intensive. Fall, spring. *Condrell*

306. Choices in Silviculture. Quantitative methods are used to evaluate silvicultural options for producing flows of timber, cash, water, wildlife habitats, and other benefits. Information for forestry is translated into quantitative terms and analyzed with system dynamics techniques. Applications for increasing the production of forests within biophysical and economic constraints. 1 unit, intensive. Fall. *Boyce*

370. Economics of Intensive Forestry. Analysis of investment in intensive forestry and comparison of alternative uses of land and capital. Methods commonly used to determine financial returns: financial maturity, present net value, internal rate of return, cash flow and benefit-cost calculations. 1 unit, intensive. Spring. *Dutrow*

375. Timberland Investment Analysis. Investment characteristics of timberlands, particularly with reference to institutional investors. Consideration of investment objectives (preservation of capital, return on investment, liquidity) and constraints (taxes, accounting conventions, legal requirements). 1 unit, intensive. Spring. *Mason*

384. Special Tax Problems for Industrial Timberland Owners. Current problems of industrial timber taxation including the use of subsidiaries in sales, Internal Revenue Service audits, valuation, financing of land, and casualties. Prerequisite: 288 or equivalent experience. 1 unit, intensive. Fall. *Condrell*

Special Studies and Projects

200. Student Projects. A group of five or more students may plan and conduct their own research project on a special topic, not normally covered by courses or seminars. A request to establish such a project should be addressed to the dean with an outline of the objectives and methods of study and a plan for presentation of the results to the school. The dean will designate the units to be earned and a faculty member for the evaluation and grading of the work of each participant. Fall, spring, summer.

201. Field Studies. Visits to and studies of resource use and management areas and activities outside the University. Variable registration fee. Units to be arranged. Fall, spring, summer. *Staff*

299. Independent Projects. Directed readings or research at the graduate level to meet the needs of individual students. Units to be arranged. Fall, spring, summer. Students should register for the course number listed below for the supervising faculty member.

299.26 *Alpert*
299.1 *Binklev*
299.2 *Boyce*
299.27 *Christensen*
299.28 *Condrell*
299.4 *Davis*
299.5 *Davison*
299.6 *Di Giulio*
299.7 *Dutrow*
299.8 *Gelbert*
299.9 *Hart*
299.10 *Heath*
299.11 *Hyde*

299.12 *Jaune*
299.13 *Knoerr*
299.15 *Maguire*
299.14 *Marin*
299.17 *Reckhow*
299.18 *Richardson*
299.19 *Royer*
299.20 *Sizemore*
299.22 *Stambaugh*
299.23 *Steen*
299.24 *Vasievich*
299.25 *Yoho*

399. Master's Project. An applied study of a forestry or environmental management problem or a theoretical research effort. A seminar presentation of the objectives, methodology, and preliminary findings is required. A written (or other medium) report at the conclusion of the project is also required. Units to be arranged. Undertaken with the guidance of the student's adviser. Fall, spring, summer.

Numerical Listing of Courses

- 191,192. Independent Study in Forestry and Environmental Studies
- 194. Conserving Natural Resources
- 200. Student Projects
- 201. Field Studies
- 203. Silvics
- 204. Forest Inventory, Growth and Yield
- 205. Silviculture
- 207. Forest Pest Management
- 208. Fire Behavior and Use
- 209. Forest Entomology
- 210. Forest Pathology
- 211. Applied Ecology and Ecosystem Management
- 212. Ecosystem Dynamics in Forest Productivity
- 213. Forest Ecosystems
- 214. Ecology of Southern Appalachian Forests (intensive)
- 215. Environmental Physiology
- 216. Applied Population Ecology
- 218. Barrier Island Ecology
- 221. Forest Soils
- 230. Weather and Climate
- 231. Environmental Climatology
- 232. Microclimatology
- 234. Watershed Hydrology
- 236. Water Quality Management
- 237. Watershed Modeling and Management
- 251. Natural Resource Data Analysis
- 252. Computer Applications for Forest Managers (intensive)
- 258. Forest Appraisal (intensive)
- 261. Remote Sensing for Resource Management
- 262. Forest Utilization (intensive)
- 263. Harvesting and Transportation Systems
- 264. Manufacturing Systems
- 267. Wildland and Wildlife Management
- 270. Resource Economics and Policy
- 280. Economics in Forest Planning and Program Implementation (intensive)
- 283. Environmental Policy and Values
- 288. Forest Taxation (intensive)
- 299. Independent Projects
- 301. Forest Nutrition Management
- 302. Models in Forest Productivity
- 304. Forest Yield
- 305. Harvesting Effects on Productivity
- 306. Choices in Silviculture (intensive)
- 308. Tree Biology
- 309. Forest Regeneration
- 310. Forest Productivity and Mineral Cycling
- 311. Ecological Toxicology
- 312. Wetlands Ecology
- 314. Integrated Case Studies in Toxicology
- 317. Applied Ecological Problem Solving
- 318. Seminar in Ecotoxicology
- 319. Seminar in Natural Resource Ecology
- 320. Seminar in Integrated Case Studies in Natural Resource Analysis
- 322. Microbiology of Forest Soils
- 328. Forest Soil Fertility
- 330. Environmental Monitoring and Instrumentation
- 331. Water Resource Systems

- 332. Air Quality Management and Modeling
- 338. Micrometeorology and Biometeorology Seminar
- 339. Seminar in Water Quality Modeling
- 350. Statistical Estimation and Inference for Resource Management
- 352. Matrix Methods for Resource Systems
- 353. Analysis of Resource Systems
- 355. Optimization Methods for Resource Management
- 361. Forest Resource Management
- 367. Seminar in Forest Resource Management
- 370. Economics of Intensive Forestry (intensive)
- 372, 373. Advanced Natural Resource Economics
- 375. Timberland Investment Analysis (intensive)
- 377. Seminar in Natural Resource Allocation and Efficiency
- 381. Natural Resource Policy
- 384. Special Tax Problems for Industrial Timberland Owners (intensive)
- 385. Decision Theory and Risk Analysis
- 388. Seminar in Resource and Environmental Policy
- 399. Master's Project

Appendix

Students Registered for the Master of Forestry Degree

- *Apgar, Laurie Jan (B.S., Albright College), Oley, Pennsylvania
- *Austin, Samuel Hess (B.S., Warren Wilson College), Black Mountain, North Carolina
- Bégin, Stephen James (B.S., University of Massachusetts), New Bedford, Massachusetts
- *Bell, Randy Lee (Marshall University), Belle, West Virginia
- Boyer, Timothy Allen (B.S., Pennsylvania State University), Laurel, Maryland
- *Brant, James Thomas (B.S., Marshall University), Huntington, West Virginia
- *Burnett, Andrew Shawhan (B.A., Lawrence University), Phoenix, Arizona
- Cork, Travis Coleman, III (B.S., Clemson University), Conway, South Carolina
- *Casper, Deborah Ann (B.S., Juniata College), Fairview, Pennsylvania
- *Elrod, Alice Bain (Miami University of Ohio), Dayton, Ohio
- Fillingham, Jack Paul (B.S.F., University of Georgia), Tallassee, Alabama
- *Gilluly, David (B.S., Moravian College), Bangor, Pennsylvania
- Hedman, Craig Wallace (B.S., University of Rhode Island), Woodcliff, New Jersey
- *Heffley, Mark Edward (B.S., Albright College), Reading, Pennsylvania
- *Helman, Richard Drew (B.S., Presbyterian College), Clinton, South Carolina
- *Hill, Loraine Ann (B.S., Xavier University), Annville, Ohio
- *Jenkins, Steve Wayne (B.S., Marshall University), Huntington, West Virginia
- Keil, Kathryn Louise (B.A., Earlham College), Ridgewood, New Jersey
- Leonard, James Brian (B.S.F., University of New Hampshire), Northport, New York
- Levine, Marc Jay (B.S., Colorado State University), Plantation, Florida
- McAleese, Robert A. (A.A.S., SUNY College of Environmental Science and Forestry; B.A., Rutgers University), Lowry, Virginia
- *Mesaros, Gail T. (B.S., Marshall University), Englishtown, New Jersey
- *Miller, David Swirls (Franklin and Marshall College), Huntingdon, Pennsylvania
- *Moser, Kathleen Marie (A.B., Duke University), Pensacola, Florida
- Moser, Warren Keith (B.A., North Carolina State University; M.B.A., Duke University), Brooklyn, New York
- Ritacco, Jeffrey L. (B.S., Rollins College), St. Paul, Minnesota
- Savage, Stuart Freeland (B.S., University of Rhode Island), Pleasant Valley, Connecticut
- *Schuetz, Kenneth John (B.S., Albright College), Bound Brook, New Jersey
- *Schultz, Glen Townsend (B.S., Moravian College), Somerset, New Jersey
- Shrestha, Manohar Lal (I.Sc., Amrit Science College; B.Sc., Tri-Chandra College; A.I.F.C., Indian Forest College), Lalitpur, Nepal
- *Spollen, Christopher (B.S., Albright College), Homer, New York
- *Stevens, Andrea (A.B., Middlebury College), Cambridge, Massachusetts
- Sullivan, John Vance (B.S., LaGrange College), Americus, Georgia
- Tjaden, Robert Lee, Jr. (A.S., B.S., University of Maine), Harrington, Delaware
- *Trautman, Charles E. (B.S., Moravian College), Churchville, Pennsylvania
- Wehrly, Sharla Kim (Earlham College), Union City, Indiana
- Werntz, James Herbert, III (B.A., Grinnell College), Charlotte, North Carolina
- *Woebkenberg, Andrea Mary (Albright College), Hatfield, Pennsylvania
- *Yanchulis, Michael Paul (Gettysburg College), Clinton, Maryland

Students Registered for the Master of Environmental Management Degree

- *Altman, Janet Lynn (B.S., Cornell College), Buffalo Grove, Illinois
- *Bachman, Scott Gordon (B.A., Thiel College), Butler, Pennsylvania
- *Baden, Richard Timothy (B.A., Cornell College), Tulsa, Oklahoma
- Bevington, Stephen Raymond (B.S., University of Wisconsin at Madison), Chicago, Illinois
- Black, Robert William (B.A., Hamilton College), Hackensack, New Jersey
- Bloomhardt, Marjorie Anne (B.S., Tufts University), Burlington, Vermont
- Bolger, Douglas Thomas (B.S., Rutgers University), San Diego, California
- Bourne, James Winslow (B.A., Colby College), Potomac, Maryland
- Brovitz, Theodore Banting (B.A., Rollins College), Rochester, New York
- *Burns, Alan Joseph (B.A., Hiram College), Youngstown, Ohio
- Burns, Neil Benton (B.S., The College of Charleston), Charleston, South Carolina
- Buschow, Ritchie Delbert (B.S., James Madison University), Falls Church, Virginia
- Butcher, Jonathan E. (A.B., Harvard University), Cary, North Carolina
- *Carney, Lynda (A.B., Duke University), New Providence, Rhode Island

*Attended an undergraduate institution participating in the Cooperative College Program.

- Ciminello, Paul Matthew (B.A., Tufts University), Eugene, Oregon
- *Coffey, Steven William (A.B., Ripon College), Arkansas City, Kansas
- Cook, Allison Gray (B.S., University of California at Davis), Bellevue, Washington
- *Crowley, Colleen Marie (The College of William and Mary), Vienna, Virginia
- *Daubner, Elaine Louise (B.A., Franklin and Marshall College), Pittsburgh, Pennsylvania
- Davis, Jay (B.A., Northwestern University), Highland Park, Illinois
- Dudzinsky, John Louis (B.S., Pennsylvania State University), Latrobe, Pennsylvania
- Fechner, Cynthia Louise (B.A., University of Virginia), Charlottesville, Virginia
- *Findell, Karen Elaine (University of Richmond), Durham, New Hampshire
- Fletcher, Scott Thomas (B.S., University of Maine), Selinsgrove, Pennsylvania
- Gallagher, Evan Patrick (B.S., Virginia Polytechnic Institute and State University), Chincoteague, Virginia
- *Ganfield, Thomas Edward (B.A., Knox College), Lincolnshire, Illinois
- *Gantert, Jeffry Paul (Franklin and Marshall College), Stevens, Pennsylvania
- Gillis, Jennifer Maria (Miami University of Ohio), Westlake, Ohio
- GINLEY, James Francis (A.B., Kenyon College), North Olmstead, Ohio
- *Gips, Dana Sue (A.B., Bard College), Larchmont, New York
- *Gollnick, Krista Ann (Whitman College), Walla Walla, Washington
- Giunand, Luisa Elena (Licentiate, Universidad Central de Venezuela), Caracas, Venezuela
- Grant, Deborah Lee (B.A., St. Andrews Presbyterian College), Hampton, Connecticut
- Guevara, Lorraine Eva (B.S., SUNY College of Environmental Science and Forestry), Amherst, New York
- *Hanson, Margaret Lyn (B.A., Wittenberg University), West End, North Carolina
- Hartwell, Richard White (B.S., Springfield College), Sanibel, Florida
- *Hepner, Patrick J. (B.S., Juniata College), Middletown, Pennsylvania
- *Heskins, Barbara Jean (B.A., Franklin and Marshall College), Upper Saddle River, New Jersey
- Hess, William R. (B.S., Vanderbilt University), Hollywood, Florida
- Hoover, Carole Suzanne (B.A., Simon's Rock College), Ft. Lauderdale, Florida
- Hua, Xiaomei (Nanjing Forestry College), Beijing, People's Republic of China
- Jacobson, Gail Einbender (B.A., Cornell University), Scarsdale, New York
- Johnson, Anne Carter (B.A., Radcliffe College), Bath, Maine
- *Johns, Susan Louise (B.A., Gettysburg College), Manhasset, New York
- *Kagel, Christine Marie (A.B., Augustana College), Jackson, Wisconsin
- Klemmer, Richard A. (B.S., University of New Hampshire), Lexington, Massachusetts
- Kokulo, Albert Garliea (B.Sc., University of Liberia), Monrovia, Liberia
- Kruger, David Adam (B.S., Brown University), South Portland, Maine
- *Lembo, Brian David (B.S., West Virginia Wesleyan College), Pennsauken, New Jersey
- *Lesitsky, Jeffrey Phillip (Moravian College), Maple Glen, Pennsylvania
- *Lincoln, Michael Olmstead (B.A., The Colorado College), Lake Forest, Illinois
- *Lisi, Karen Jean (B.S., The College of William and Mary), Princeton, New Jersey
- *Lowe, Elizabeth Talbot (Duke University), Richmond, Virginia
- Macbeth, Carol Eileen (B.A., Wellesley College), Berwyn, Pennsylvania
- Mangles, Juan Carlos (B.S., University of Vermont), Puerto la Cruz, Venezuela
- Marty, Rebecca Suzanne (B.A., Carleton College), Mason City, Iowa
- *Mason, Victoria Anne (B.A., Lawrence University), Appleton, Wisconsin
- *McManaway, Christine Joy (B.A., Albion College), Monroe, Michigan
- *Meese, Gregory J. (A.B., Duke University), Cincinnati, Ohio
- Miller, Ellyn Claire (B.S., University of California at Davis), Los Altos Hills, California
- Mlynczak, Bernard Joseph (B.A., University of Missouri), St. Louis, Missouri
- *Nagle, Elizabeth Ann (B.S., Albright College), Athens, Pennsylvania
- *Norton, Richard Kenvin (B.A., The College of Wooster), Elyria, Ohio
- O'Connell, Peter James (B.Met., University of Newcastle), Shortland, New South Wales, Australia
- Pace, Charles Bennett (B.S., Lynchburg College), Rocky Mount, Virginia
- Patchak, Ann Elizabeth (B.A., University of Michigan), Ypsilanti, Michigan
- *Pierce, Richard Brayton, Jr. (B.S., The College of William and Mary), Alexandria, Virginia
- *Pursell, Roberta Helene (B.A., Warren Wilson College), Asheville, North Carolina
- *Quindlen, Kathleen Judith (B.S., The College of William and Mary), Falls Church, Virginia
- *Records, David Kent (B.A., Franklin College), Edinburg, Indiana
- *Rinck, Robert Todd (B.S., Miami University of Ohio), Indianapolis, Indiana
- Rogge, Lee Ann (B.A., Dartmouth College), Alexandria, Virginia
- Romano, William D. (B.A., University of Dayton), Philadelphia, Pennsylvania
- Rosenbaum, Debra Jean (B.A., University of Delaware), Chestertown, Maryland
- *Sams, Charles Edward (B.S., Warren Wilson College), Asheville, North Carolina
- *Seadale, Scott Edward (B.A., Gettysburg College), Ft. Lauderdale, Florida
- Soyka, Peter A. (B.A., University of Vermont), Newton, Massachusetts
- *Stockton, Thomas Barber (A.B., Duke University), Charlotte, North Carolina

Tramm, Edwin Capper (B.S., University of Illinois), Chapel Hill, North Carolina
 *Thomas, Richard Niel (B.S., Warren Wilson College), Swannanoa, North Carolina
 *Tippett, JoAnne (B.A., The College of Wooster), Pittsburgh, Pennsylvania
 Trayer, John Scott (B.S., Castleton State College), Rutland, Vermont
 *Trombetta, Robert (B.S., SUNY College at Cortland), Carmel, New York
 Vaas, Pauline Ann (B.S., University of Rhode Island), Middletown, Rhode Island
 Vogel, Ann Hildreth (B.S., Dickinson College), Los Angeles, California
 Vogt, John David (B.A., East Stroudsburg State College), Orangeville, Pennsylvania
 Washburn, Peter Cruikshank (B.S., University of Maine), Peapack, New Jersey
 Weaver, James William (B.S., Pennsylvania State University), Jackson Center, Pennsylvania
 Winegar, James Benard (B.S., University of North Carolina at Wilmington), Raleigh, North Carolina
 Wood, Judith Gayle (B.S., Tennessee Technological University), Carrboro, North Carolina
 Woods, Joseph Godfrey (B.S., University of North Carolina at Chapel Hill), Winston-Salem, North Carolina
 Wynne, Thomas Joseph (B.S., Maryville College), Franklin, Tennessee

Students in the Department of Forestry and Environmental Studies of the Graduate School

In Residence

Andaya, Armando Avila (B.S., M.S., Ph.D., University of St. Thomas; M.S., University of Wales), San Pablo City, Laguna, Philippines
 Andrianarivo, Jonah A. (D.E.A., University of Madagascar), Antananarivo, Madagascar
 Carey, William Allen (A.S., Miami-Dade Junior College; B.S., M.S., University of Florida), Naranja, Florida
 Derr, Leslie Kay (B.A., Drew University), Durham, North Carolina
 Di Mauro, Thomas Michael (B.S., M.S., Massachusetts Institute of Technology), Rockfall, Connecticut
 Habig, R. Clifford (B.A., University of Southern Maine; M.S., University of Georgia), Chebeague Island, Maine
 Ho, Menghi (B.S., National Taiwan University), Taipei, Taiwan
 Horton, Alison Curtis (B.A., University of California at Santa Cruz), Washington, D.C.
 Huang, Ce (M.S., Shanghai Institute of Plant Pathology), Shanghai, People's Republic of China
 Jacobson, Susan Kay (B.A., Brown University; M.S., University of Florida), Dover, Massachusetts
 Krutilla, Kerry Maca (B.A., Grinnell College), Washington, D.C.
 Mack, Karen L. (A.B., Duke University), Durham, North Carolina
 Mather, Ellen Lyles (B.A., Wellesley College), Elmer, New Jersey
 Mitchell, James E. (B.S., University of California at Irvine; M.S., University of Michigan), Orange, California
 Newman, David Hilder (B.S., University of California at Berkeley), Santa Rosa, California
 Provencher, Robert William (B.S., Cornell University), Creedmoor, North Carolina
 Pye, John Matthew (B.A., Swarthmore College; M.A., University of North Carolina at Chapel Hill), Durham, North Carolina
 Raich, James William (B.S., Michigan State University; M.S., University of Florida), Gainesville, Florida
 Rieff, Susan Karol (B.S., Texas Christian University; M.P.A., University of Texas at Austin), Washington, D.C.
 Rome, Abigail (B.A., Colby College), Somerville, Massachusetts
 Smith, Marck Griffin (A.B., Harvard University), Durham, North Carolina
 Swallow, Stephen K. (B.S., Cornell University), Ithaca, New York
 Williams, Harvey Timothy (B.S., University of North Carolina at Chapel Hill), Durham, North Carolina
 Woodbridge, William Craig (B.A., Dartmouth College), Topsfield, Massachusetts
 Young, David Lawrence (B.S., Lenoir-Rhyne College; M.F., Duke University), Durham, North Carolina

In Absentia

Lesh, Steven August (B.S.Ch.E., University of Cincinnati; M.S.E.E., M.A.C.T., University of North Carolina at Chapel Hill), Chapel Hill, North Carolina
 Liggett, Annette Sue (B.S., Kent State University), Stow, Ohio
 Wick, John Glen (B.A., University of Notre Dame; M.L.A., University of Virginia), Baton Rouge, Louisiana

On Leave of Absence

Anderson, Elizabeth Carr (B.A., University of Wisconsin; M.P.S., Cornell University), Callao, Virginia
 Jacobson, Paul T. (B.A., Cornell University), Hamilton, Virginia
 Simpson, John Warfield (B.S.L.A., Ohio State University; M.L.A., Harvard University), Columbus, Ohio
 Stickholm, Peter W. (B.A., The Colorado College), Bloomington, Indiana

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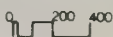
WEST CAMPUS 77XX

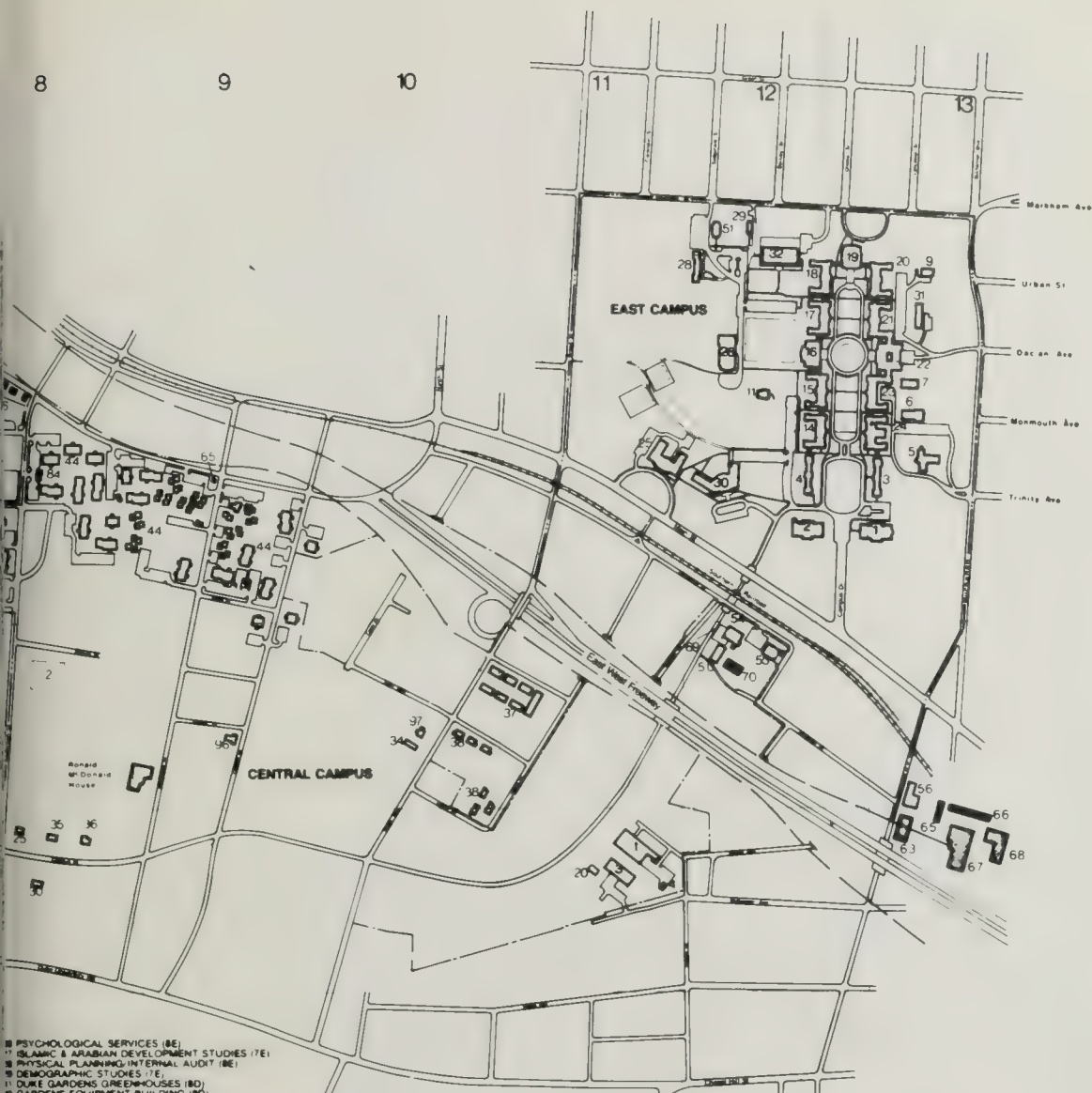
- 1 DUKE CHAPEL (SD)
- 2 QUAY BUILDING (SD)
- 3 DIVINITY SCHOOL (SD)
- 4 PERKINS LIBRARY (SD)
- 5 LANGUAGE CENTER (SD)
- 6 OLD CHEMISTRY BUILDING (SD)
- 7 DIVINITY SCHOOL ADDITION (SD)
- 8 SOCIOLOGY/PSYCHOLOGY BUILDING (SD)
- 9 SOCIAL SCIENCES BUILDING (SD)
- 10 ORAVEN QUAD (SE)
- 11 CROWELL QUAD (SE)
- 12 KILGO QUAD (SE)
- 13 UNION BUILDING (SD)
- 14 FLOWERS BUILDING (SD)
- 15 PAGE AUDITORIUM (SD)
- 16 CARD GYMNASIUM (AF)
- 17 WALLACE WADE STADIUM (AF)
- 18 UNDERGRAD ADMISSIONS & FINANCIAL
- 19 INSTITUTIONAL ADVANCEMENT OFFICE
- 20 UNIVERSITY RELATIONS (7E)
- 21 ALUMNI AFFAIRS (7E)
- 22 2111 CAMPUS DRIVE (7E)
- 23 CENTER FOR INTERNATIONAL STUDIES

DUKE UNIVERSITY



OFFICE OF THE UNIVERSITY ARCHITECT
DEPARTMENT OF PHYSICAL PLANNING
JAMES A. WARD — DIRECTOR





- 10 PSYCHOLOGICAL SERVICES (BE)
- 11 ISLAMIC & ARABIAN DEVELOPMENT STUDIES (TE)
- 12 PHYSICAL PLANNING/INTERNAL AUDIT (BE)
- 13 DEMOGRAPHIC STUDIES (TE)
- 14 DUKE GARDENS GREENHOUSES (BD)
- 15 GARDENS EQUIPMENT BUILDING (BD)
- 16 FRICK-YEAGER BUILDING (AF)
- 17 FEW QUAD (SE)
- 18 CAMPBORN INDOOR STADIUM (AF)
- 19 SUB STATION #4 (SF)
- 20 SUB STATION #5 (SC)
- 21 TELECOMMUNICATIONS BUILDING (SC)
- 22 ENGINEERING BUILDING (SC)
- 23 ENGINEERING BUILDING ADDITION (SC)
- 24 PHYSICS BUILDING (AC)
- 25 DR. HART'S RESIDENCE (SE)
- 26 ALLEN BUILDING (BD)
- 27 HEATING PLANT (SC)
- 28 WAINWRIGHT HALL (SC)
- 29 NORTH BUILDING (SE)
- 30 VAN DE GRAFF BUILDING (AD)
- 31 BIOLOGICAL SCIENCES BUILDING (AD)
- 32 LAW BUILDING (SE)
- 33 FUDALA SCHOOL OF BUSINESS (SE)
- 34 FACULTY CLUB (SF)
- 35 PRIMATE FACILITY
- 36 P. H. GROSS CHEMICAL LABORATORY (3D)
- 37 TEER ENGINEERING LIBRARY BUILDING (SC)
- 38 NUCLEAR LABORATORY (AC)
- 39 FEW QUAD EQUIPMENT BUILDING (SE)
- 40 BIOLOGICAL BUILDING (AC)
- 41 BIO SCIENCES GREENHOUSES (AD)
- 42 FIELD HOUSE (AD)
- 43 ANIMAL BEHAVIORAL STATION
- 44 INTRAMURAL BUILDING (SF)
- 45 GOLF COURSE CADDY HOUSE (3G)
- 46 GOLF COURSE CLUB HOUSE (2G)
- 47 GOLF COURSE TOOL HOUSE
- 48 TABARD HALL (BE)
- 49 HINCKLEY COURT (BE)
- 50 TAYLOR HALL (BE)
- 51 LANCASTER HOUSE (BE)
- 52 COOKING BASEBALL STADIUM (AF)
- 53 BRYAN CENTER (SE)
- 54 GRADUATE (TF)
- 55 EXPERIMENTAL BOTANY PLOT & BLDG (2F)
- 56 TOOL STORAGE WAREHOUSE (4G)
- 57 STORAGE BUILDING (4G)
- 58 ATHLETIC & P. E. FACILITIES
- 59 SWIMMING POOL (SF)

MEDICAL CENTER 75XX

- 1 GERONTOLOGY (BC)
- 2 D & T NO 3 (BC)
- 3 CLINICAL RESEARCH NO 1 (BC)
- 4 MAIN ENTRANCE HOSPITAL (BC)
- 5 CLINICAL RESEARCH NO 2 (BC)
- 6 BAKER HOUSE (BC)
- 7 SCHOOL OF MEDICINE (BD)
- 8 DUKE HOSPITAL SOUTH (BC)
- 9 BELL BUILDING (BB)
- 10 HANES ANNEX (7B)
- 11 HANES HOUSE (BB)
- 12 TRENT DRIVE HALL (7B)
- 13 MARSHALL H. DUKE BUILDING (MSH) (SC)
- 14 HEALTH CARE SYSTEMS (BB)
- 15 MARSHALL PICKENS REHAB CENTER (7B)
- 16 BROMA THEMATICS (BB)
- 17 RESEARCH PARK BLDG NO 1 (4B)
- 18 RESEARCH PARK BLDG NO 2 (4B)
- 19 RESEARCH PARK BLDG NO 3 (4C)
- 20 RESEARCH PARK BLDG NO 4 (4B)
- 21 CHILD GUIDANCE CLINIC (7A)
- 22 VIVARIUM (4B)
- 23 EMPLOYEE RELATIONS (BB)
- 24 TEMPORARY SERVICES (BB)
- 25 CIVITAN BUILDING (BA)
- 26 2242 ERWIN ROAD (BB)
- 27 VOLATILE STORAGE (BC)
- 28 ALEX H. SANDS JR. BLDG (MS-1-B) (5B)
- 29 EYE CENTER (5B)
- 30 SEELEY G. MUDDO BLDG M.C. LIBRARY (SC)
- 31 2212 ERWIN ROAD (BB)
- 32 SUB STATION NO 1 (4B)
- 33 SUB STATION NO 2 (7B)
- 34 M.C. PARKING STRUCTURE #1 (BC)
- 35 NURSING SCHOOL ADDITION (BB)
- 36 ANIMAL LAB ISOLATION FACILITY (ALIF) (4B)
- 37 EDWIN A. MORRIS CLINICAL CANCER BLDG (CRH) (BC)
- 38 PHYSICAL PLANT (BC)
- 39 DUKE HOSPITAL NORTH (BB)
- 40 DUKE LAUNDRY RESEARCH BLDG (SC)
- 41 EDWIN L. JONES BLDG (MS-1-C) (5B)

- 51 BREAST CANCER DETECTION DEMONSTRATION PROJECT (2C)
- 52 DIALYSIS CENTER (1C)
- 53 M.C. PARKING GARAGE #2 (BB)
- 54 NEARLY NEW SHOPPE (1A)

MEDICAL CENTER 79XX

- 56 M.C. ENGINEERING & OPERATIONS
- 63 PRINTING SHOP

MEDICAL CENTER 80XX

- 52 DUKE HOSPITAL WEST UNIT (2C)

CENTRAL CAMPUS 70XX

- 65 PHYSICAL PLANNING ANNEX (BC)
- 67 PLANT ACCOUNTING (10D)

CENTRAL CAMPUS 71XX

- 1 HOSPITAL LAUNDRY (11E)
- 2 SUB STATION NO 3 (BD)
- 3 MEDICAL CENTER STORAGE BLDG (11E)
- 4 TELEPHONE TERMINAL BLDG (11E)
- 20 ART DEPT. SCULPTURE STUDIO (11E)
- 25 INTERNATIONAL HOUSE (BE)
- 30 2021 CAMPUS DRIVE (RESIDENCE) (BE)
- 34 PLANT ACCOUNTING (10D)
- 35 WAGE & SALARY (BE)
- 36 PUBLIC SAFETY DEPARTMENT (BE)
- 37 TOWNHOUSE APARTMENTS (11D)
- 38 MODULAR HOUSING (10D)
- 40 CENTRAL CAMPUS HOUSING (BC)
- 44 CENTRAL CAMPUS HOUSING OFFICE (BC)
- 68 WM. HENRY JORDAN BLDG (PANEL HOUSE) (BD)

EAST CAMPUS 72XX

- 1 EAST DUKE BUILDING (13C)
- 2 WEST DUKE BUILDING (12C)
- 3 AYCOCK RESIDENCE HALL (13C)
- 4 JARVIS RESIDENCE HALL (12C)
- 5 EPWORTH HALL (13C)
- 6 CROWELL SCIENCE (13B)
- 7 THE ATRIUM (13B)
- 8 BISHOP'S HOUSE (13B)
- 11 CAMPUS CENTER (12B)
- 14 CAMP BUILDING (12B)
- 15 GILES RESIDENCE HALL (12B)
- 16 EAST CAMPUS LIBRARY (12B)
- 17 ALSPAUGH RESIDENCE HALL (12B)
- 18 PEGRAM RESIDENCE HALL (12B)
- 19 BALDWIN AUDITORIUM (12B)
- 20 BASSETT RESIDENCE HALL (13B)
- 21 BROWN RESIDENCE HALL (13B)
- 22 EAST CAMPUS UNION (13B)
- 23 WILSON HOUSE (13B)
- 24 ART MUSEUM (13B)
- 25 SOUTHGATE RESIDENCE HALL (11C)
- 26 MEMORIAL GYMNASIUM (12B)
- 28 BIVINS BUILDING (12B)
- 32 MARY DUKE BIDDLE MUSIC BUILDING (12A)
- 33 GILBERT ADDAMS RESIDENCE HALL (12C)
- 31 INFIRMARY (13B)
- 50 CABINET SHOP (12D)
- 51 ART BUILDING (12A)
- 52 HEATING PLANT (12D)
- 53 PAINT SHOP & STORAGE BUILDING (12D)
- 56 PURCHASING BUILDING (13D)
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- 65 LUMBER STORAGE (13E)
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- 69 EAST CAMPUS SUB STATION (12D)
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*NOT SHOWN ON MAP

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Durham, NC 27706

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Duke University 1985

Marine Laboratory





bulletin of
Duke University 1985

Marine Laboratory

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Calvin L. Ward, Ph.D., *Director of the Summer Session*

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Joseph S. Ramus, *Assistant Director for Academic Programs*
*Richard T. Barber, *Assistant Director for Oceanographic Programs*
Joseph Bonaventura and Celia Bonaventura, *Assistant Directors for Marine Biomedical Programs*
Michael P. Bradley, *Assistant Director for Administration and Development*

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Alician V. Quinlan, *Associate Professor of Mechanical Engineering and Materials Science*
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Robert E. Webster, *Professor of Biochemistry*
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David R. Shumate, *Director of Sponsored Programs*
Calvin L. Ward, *Professor of Zoology and Director of the Summer Session*

Academic Staff

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Celia Bonaventura, *Assistant Medical Research Professor—Biochemistry. Protein structure and function.*
Joseph Bonaventura, *Assistant Medical Research Professor—Biochemistry. Protein structure and function.*
C. G. Bookhout, *Professor Emeritus of Zoology. Marine invertebrate embryology and invertebrate zoology.*
Marius Brouwer, *Research Assistant Professor—Marine Laboratory. Protein biochemistry.*
John D. Costlow, *Professor of Zoology. Marine invertebrate embryology and experimental zoology.*
David W. Evans, *Research Associate—Marine Laboratory. Marine chemistry.*
†Richard B. Forward, *Associate Professor of Zoology and Director of Undergraduate Student Affairs, Marine Laboratory. Physiology of marine animals.*
John Gutknecht, *Professor of Physiology. Membrane physiology.*
Thomas C. Johnson, *Associate Professor of Geology and Director of the Duke University of North Carolina Oceanographic Consortium. Geological oceanography.*
William W. Kirby-Smith, *Research Associate Professor—Marine Laboratory. Marine ecology.*

*On sabbatical leave September 1984–May 1985.

†On sabbatical leave January–December 1985.



- ‡David R. McClay, *Associate Professor of Zoology and Assistant Professor of Immunology*. Developmental biology.
- Kenneth R. McKaye, *Research Associate Professor—Marine Laboratory*. Behavioral ecology.
- §Orrin H. Pilkey, *Professor of Geology*. Geological oceanography.
- Joseph S. Ramus, *Associate Professor of Botany and Director of Graduate Student Affairs, Marine Laboratory*. Algal ecological physiology.
- Daniel Rittschof, *Research Assistant Professor—Marine Laboratory*. Physiology of marine animals.
- Brenda Sanders, *Research Assistant Professor—Marine Laboratory*. Stress physiology.
- ‡Richard B. Searles, *Associate Professor of Botany*. Marine phycology.
- J. Bolling Sullivan, *Associate Professor of Biochemistry*. Comparative and evolutionary biochemistry.
- John P. Sutherland, *Associate Professor of Zoology*. Marine ecology.
- #T. Dudley Wallace, *Professor of Economics*. Economic statistics and microeconomic theory.



‡ Summer only.

§ Spring only.

#Fall only.

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Olive C. Godette, *Housekeeping Supervisor*

Claudia O. Davis, *Housekeeper Senior*

Catherine Gibbs, *Housekeeper*

Eunice T. Godette, *Housekeeper*

Mildred E. Tyre, *Housekeeper*

Bettie E. Tyson, *Housekeeper*

L. Thomas Morton, *Head Cook*

Sylvester Murray, *Assistant Head Cook*

Norris A. Hill, *Manager, Physical Plant*

Clifton W. Davis, *Maintenance Foreman*

Ellen D. Jones, *Accounting Clerk Senior*

James G. Chadwick, *Groundskeeper*

Donald Gagnon, *Electrician*

Horace R. Holland, *Mechanic*

Vance G. Mason, *Carpenter Senior*

James L. Willis, *Captain, R/V First Mate*

Dianne R. Gagnon, *Manager, Finances*

Patricia M. Nolin, *Staff Specialist*

Norma S. Troutman, *Staff Specialist*

Sophia D. Turnage, *Staff Specialist*

Mamre M. Wilson, *Staff Assistant*

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Scott D. Taylor, *Photographer*

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William D. Hunnings, *Electronics Technician Senior*

Lilian I. Lorenzsonn-Willis, *Staff Specialist*

Jean S. Williams, *Library Associate*

Joseph Bonaventura and Celia Bonaventura, *Codirectors of the Marine Biomedical Center*

Belinda K. Beckwith, *Administrative Secretary*

Joseph F. Ustach, *Executive Officer, Duke/University of North Carolina Oceanographic Consortium*

Eric B. Nelson, *Marine Superintendent, Duke/University of North Carolina Oceanographic Consortium*

George A. Newton, *Assistant Marine Superintendent, Duke/University of North Carolina Oceanographic Consortium*

Dorothy T. Johnson, *Staff Assistant*

Sue Book, *Senior Clerk Typist*

Timothy W. Boynton, *Electronics Technician Senior*

David L. Bunting, *Draftsman Senior*

Richard C. Ogus, *Master, R/V Cape Hatteras*

Orville G. Weeks, *Chief Engineer, R/V Cape Hatteras*

Curtis A. Oden, *Deck Engineer, R/V Cape Hatteras*

William Shepherd, *Steward/Cook, R/V Cape Hatteras*

Dale H. Murphy, *Second Mate, R/V Cape Hatteras*

Richard S. Leddy, *First Assistant Engineer, R/V Cape Hatteras*

Craig Morton, *Cook/Messman, R/V Cape Hatteras*

Larry N. Morris, *Boatswain, R/V Cape Hatteras*

General Information



The Beaufort Setting

The Duke University Marine Laboratory is situated on fifteen acres of Pivers Island, within the Outer Banks of North Carolina, and adjacent to the historic town of Beaufort. Beaufort itself is the third oldest town in the state and is surrounded by fishing and agricultural communities. Cape Lookout National Seashore Park and the Rachel Carson Estuarine Sanctuary are located within easy boating distance of the Marine Laboratory. From the Marine Laboratory, as well as from the Beaufort waterfront and its boardwalk, one can often see feral horses grazing, see egrets or pelicans flying by, or just observe the beautiful natural scenery in its entirety.

The Natural Resources for Study and Research

The area's system of barrier islands, sounds, and estuaries is well-known for its rich flora and fauna, and diverse habitats, including rivers, creeks, mud flats, unspoiled sand beaches, dunes, marshes, peat bogs, cypress swamps, bird islands, and coastal forests, making the area an excellent haven for both nature lovers and/or those interested in the pursuit of marine science. The area lies within the range of both the temperate and tropical species of biota. The edge of the Gulf Stream oscillates between twenty and thirty miles offshore, with occasional reefs in between. A great variety of phytoplankton, seaweeds, seagrasses, and marshgrasses may be found in the area. Common animals include the blue crab, squid, shrimps, snails, clams, ctenophores, jellyfish, hydroids, sponges, polychaetes, sea urchins, starfish, brittle stars, sand dollars, skimmers, terns, gulls, herons, sea turtles, porpoises, and many species of fish. All provide ample opportunity for study and research and are readily accessible from the Marine Laboratory on foot, by car, or by boat.

The Marine Laboratory

This rich abundance of marine flora and fauna attracted Dr. A. S. Pearse and his friends to Pivers Island, which was subsequently selected as a location for a marine laboratory. Through the efforts of Dr. Pearse, the land was acquired for the Duke University Marine Laboratory, and in 1938 the first summer classes were offered. Originally, the laboratory served only as a summer training and research facility.

The Marine Laboratory has experienced tremendous growth since 1938, and today operates year-round to provide training and research opportunities to more than 1,500 persons annually, including undergraduate and graduate students enrolled in the laboratory's academic programs, visiting student groups who utilize the labora-

tory's facilities, as well as scientists who come from North America and abroad to conduct their own research.

The Marine Laboratory is an interdepartmental training and research facility of Duke University, and as such operates under the policies, procedures, and regulations of the University. Each resident faculty member is affiliated with one or more department of the University. The resident faculty represent the fields of biochemistry, ecology, developmental biology, geology, oceanography, physiology, and systematics.

Pivers Island is only 150 yards across the channel from Beaufort, with a bridge leading to U.S. Highway 70, making the island readily accessible by automobile. Other transportation to the laboratory consists of bus service to Beaufort (via New Bern, North Carolina) and airline service to regional airports (New Bern, Kinston, or Jacksonville).

The modern physical plant consists of twenty-three buildings, including four dormitories, a large dining hall, one residence, boathouse, storehouse for ship's gear, classroom laboratories, six research buildings, and a maintenance complex.

On the Marine Laboratory campus there are recreational facilities for fishing, swimming, rowing, sailing, shuffleboard, volleyball, and croquet. There are also ample opportunities for recreation in and around Beaufort. The Beaufort area is well-known for its moderate climate, tempered by the Gulf Stream.

The laboratory's year-round seminar/lecture series features many distinguished scientific speakers from across the nation and abroad who help to acquaint both students and fellow researchers with the latest findings in their respective research areas, or present other lectures of a more general nature. Many of the lectures are open to the public as well as to personnel from surrounding marine facilities.

The Beaufort-Morehead City area provides location for five other marine-oriented facilities which collectively are one of the higher concentrations of marine scientists in the nation. These are the University of North Carolina, Institute of Marine Sciences; North Carolina State University, Seafood Laboratory; State of North Carolina, Marine Resources Center; State of North Carolina, Division of Marine Fisheries; and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Beaufort Laboratory. This concentration of marine scientists provides a critical mass for the pursuit of science and education.

THE DUKE/UNIVERSITY OF NORTH CAROLINA OCEANOGRAPHIC CONSORTIUM

The Oceanographic Consortium operates a 131-foot research vessel, the R/V *Cape Hatteras*, a coastal zone research vessel. The ship operates in the western North Atlantic, concentrating in the region between Nova Scotia and the Caribbean. The ship is a member of the academic research fleet supported by the National Science Foundation for the purpose of providing oceanographic research opportunities to investigators. R/V *Cape Hatteras* is used for training at sea by the five universities that make up the Oceanographic Consortium (Duke, North Carolina State, UNC-Chapel Hill, UNC-Wilmington, and East Carolina). The consortium also manages the acquisition and maintenance of oceanographic instrumentation used aboard R/V *Cape Hatteras*, and promotes annual meetings of marine science staff and graduate students from member institutions. These meetings are held at the Duke University Marine Laboratory.

THE MARINE BIOMEDICAL CENTER

The National Institute of Environmental Health Sciences (NIEHS) provides support to the Duke University Marine Biomedical Center with the objective of promoting research in the marine sciences relevant to problems of environmental health. The research goals of the Duke University Marine Biomedical Center are to gain an un-

derstanding of the mechanisms involved in the adaptation of man and other organisms to an environment that is both hostile and continually changing. Emphasis is on the biochemical and biological impact of metallic pollutants.







Studies at the center concern: (1) the effects of chemical pollutants on respiratory proteins and electron transport proteins; (2) the effects of metal and nonmetal pollutants on larval development of various invertebrates; (3) pollutant toxicology using blood as a model organ; (4) behavioral aspects of pollution of estuarine and marine systems; (5) the role of metal and nonmetal pollutants in processes associated with animal, plant, and artificial membrane systems; and (6) effects of heavy metals on ion transport phenomena and cellular membrane potentials. Feasibility studies are conducted to explore the advantages of various experimental approaches and to encourage innovative research.

The Beaufort Experience

The Marine Laboratory is an academic community and the self-sufficient nature of its residential life serves well those who come here to study or to conduct research. The academic programs are limited to fifty students per regular academic semester or summer term (spring, summer, or fall), making for small group learning. Although recreational opportunities are ample, the distractions are limited, allowing both student and researcher to become totally involved in the pursuit of marine science. Both students and researchers alike find that the Marine Laboratory has an invitingly open, friendly, and relaxed atmosphere which appears to draw many back year after year. This community feeling, as well as the potential for total immersion, has become part of what has been termed the Beaufort experience.

Academic Programs



1985 Duke University Marine Laboratory Calendar												
Program	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Spring	 (Jan. 9 - April 27)											
COOP*	 (April 1 - May 4)											
Summer	I  (May 6 - June 7)											
	II  (June 10 - July 12)											
	III  (July 15 - Aug. 16)											
Fall	 (Aug. 26 - Dec. 14)**											
* Cooperative Undergraduate Program in Marine Science ** Tentative dates												

Spring Semester—Undergraduate Marine Sciences Program

9 January-27 April 1985

A full study list ordinarily is four (4) course credits. The curriculum consists of the courses below.

Biological Oceanography. (Botany 114L or Zoology 114L.) Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms. Laboratory emphasis. Prerequisite: introductory biology. One course. *Ramus and Barber*

Physiology of Marine Animals. (Zoology 150L.) Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. One course. *Rittschof*

Geological Oceanography. (Geology 205S.) Broad geologic aspects of the ocean basins including origin, bottom physiography, sediment distribution, and sedimentary processes. Field observations; sampling procedures. Not open to students who have completed Geology 206S. One course. *Johnson*

Chemical Oceanography. (Geology.) Course number and description to be announced. One course. *Evans*

Physical Oceanography. (Geology.) Seminar number and description to be announced. Half course. *Johnson*

Beach and Island Geological Processes. (Geology 196S.01.) Processes affecting the evolution of beaches and barrier islands with emphasis on the effect of construction. Half course. *Pilkey*

Adaptations of Organisms to the Marine Environment. (Biochemistry 220S.01.) Introduction to basic concepts of biochemistry and to variables in the marine environment which evoke adaptive responses. Specific adaptations at the molecular level. Biological fitness from a biochemical viewpoint. Half course. *Bonaventura*

Experimental Ecology of the Marine Intertidal Zone. (Zoology 296S.72.) Reading and discussion of papers published since about 1960. Half course. *Sutherland*

Marine Fishes: Selected Topics. (Zoology 296S.84.) Lectures and readings on various aspects of the ecology, physiology, and genetics of marine fishes with emphasis on the local fauna. Two field trips will familiarize students with the identification and community structure of estuarine species. Half course. *Forward, Sullivan, and staff*

Independent Study. (Biochemistry 210, Botany 192, Geology 192, or Zoology 192.) For seniors and juniors with consent of the appropriate Director of Undergraduate Studies and the supervising instructor. One course. *Staff*

COOPERATIVE UNDERGRADUATE PROGRAM IN THE MARINE SCIENCES

1 April-4 May 1985

During the late spring, the Duke University Marine Laboratory offers an intensive five-week program on the marine environment to students from institutions which have no marine laboratory facilities.

Lectures in the program cover the physical, chemical, geological, and biological aspects of the marine environment with emphasis on the ecology of marine organisms. Numerous field trips are made to estuarine and near-shore habitats which involve environmental measurements, identification of plants and animals collected, and discussion with emphasis on morphological, physiological, and ecological adaptations to the particular habitat. Live animals are used in laboratory experiments on physiology and behavior aimed at an understanding of the functioning of animals and their natural environment. Students read original research papers, give oral reports on relevant topics, and submit written reports on laboratory and field work.

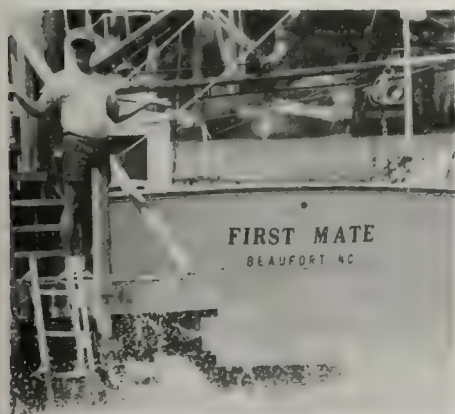
First Summer Term

6 May-7 June 1985

Marine Biology. (Biology 10L.) Physical and chemical characteristics of marine ecosystems and the functional adaptations of marine organisms to these systems. Lectures, field trips, and laboratories. For students not majoring in a natural science. One course (4 s.h.*). *Kirby-Smith*

Introduction to Biological Oceanography. (Botany 114L or Zoology 114L.) Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms.

*Semester hour(s) = s.h.



Laboratory emphasis. Not open to students who have had Geology 53 or Botany 53. Prerequisite: introductory biology. One and one-half courses (6 s.h.). *Staff*

Physiology of Marine Animals. (Zoology 150L/250L.) Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. One course or 4 graduate units (4 s.h.). *Forward*

Marine Invertebrate Zoology. (Zoology 176L.) Structure, functions, and development of invertebrates collected from estuarine and marine habitats. Not open to students who have had Zoology 175 or 274. Prerequisite: introductory biology. One and one-half courses (6 s.h.). *Bookhout*

Independent Study. (Botany 191 or Zoology 191.) For senior and junior majors with permission of the appropriate Director of Undergraduate Studies and the supervising instructor. Course credit to be arranged. *Staff*

Research. (Botany 359.) Individual investigation in the various fields of botany. Credit to be arranged. (For graduate students only.) *Staff*

Research. (Zoology 353.) To be carried on under the direction of the appropriate staff members. Hours and credit to be arranged. (For graduate students only.) *Staff*

Second Summer Term

10 June-12 July 1985

Marine Ecology. (Zoology 203L.) Application of ecological theory to marine systems. Mathematical properties of population growth and species interactions; field and laboratory projects with computer-assisted analysis of data. Practice in scientific writing. Readings from current scientific publications. Prerequisites: introductory biology or invertebrate zoology, and calculus; knowledge of statistics helpful. One and one-half courses or 6 graduate units (6 s.h.). *Hay (visiting summer faculty)*

Primary Productivity in the Seas. (Botany 215L or Zoology 215L.) The biological flux of carbon in the coastal and open seas involving phytoplankton, seaweeds, seagrasses, and marshgrasses. The contributions of these primary producers to food chain processes and global atmospheric-sedimentary cycles, as well as the ecological consequences of variations in photosynthetic mechanisms. Prerequisites: introductory biology and introductory chemistry. One course or 4 graduate units (4 s.h.). *Barber and Ramus*

Barrier Island Ecology. (Botany 218 or Environmental Studies 218.) Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. One and one-half courses or 6 graduate units (6 s.h.). *Leatherman (visiting summer faculty)*

Comparative and Evolutionary Biochemistry. (Biochemistry 276.) Lectures and discussion of the origin of life, evolution of genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of the instructor. One and one-half courses or 6 graduate units (6 s.h.). *Sullivan*

Behavior and Ecology of Fishes. (Zoology 296S.) Behavioral theory applied to life history patterns, predation, competition, and community structure. Laboratory and field projects. Basic ecology, evolution, or behavior course recommended. One course or 4 graduate units (4 s.h.). *McKaye*

Independent Study. (Botany 192 or Zoology 192.) For senior and junior majors with permission of the appropriate Director of Undergraduate Studies and the supervising instructor. Course credit to be arranged. *Staff*

Research. (Botany 360.) Individual investigation in the various fields of botany. Credit to be arranged. (For graduate students only.) *Staff*

Research. (Zoology 354.) To be carried on under the direction of the appropriate staff members. Hours and credit to be arranged. (For graduate students only.) *Staff*

Third Summer Term

15 July-16 August 1985

Marine Biology. (Biology 10L.) Physical and chemical characteristics of marine ecosystems and the functional adaptations of marine organisms to these systems. Lectures, field trips, and laboratories. For students not majoring in a natural science. One course (4 s.h.). *Kirby-Smith*

Marine Policy. (Public Policy Studies 195S.) Formal study of policy and policy making regulating the exploitation of the marine environment. History of specific marine-related organizations, legislation, and issues are traced and their effects on local, regional, national, and international arenas. Topics explored through use of theoretical and methodological perspectives, including political science, sociology, and economics. Lectures, including seminar presentations by visiting marine policy makers and policy analysts. Major emphasis is national in scope; some examples from North Carolina and the Mid- and South Atlantic areas. One course (3 s.h.). *Orbach (visiting summer faculty)*

Marine Invertebrate Zoology. (Zoology 274L.) Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips included. Not open to undergraduate students who have had Zoology 175 or 274. Prerequisite: introductory biology. One and one-half courses or 6 graduate units (6 s.h.). *Barnes (visiting summer faculty)*

Invertebrate Developmental Biology. (Zoology 278L.) Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. One and one-half courses or 6 graduate units (6 s.h.). *McClay and visiting staff*

Independent Study. (Botany 191 or Zoology 191.) For senior and junior majors with permission of the appropriate Director of Undergraduate Studies and the supervising instructor. Course credit to be arranged. *Staff*

Research. (Botany 359.) Individual investigation in the various fields of botany. Credit to be arranged. (For graduate students only.) *Staff*

Research. (Zoology 353.) To be carried on under the direction of the appropriate staff members. Hours and credit to be arranged. (For graduate students only.) *Staff*



Fall Semester—Undergraduate Marine Sciences Program

26 August—14 December 1985*

The curriculum consists of the courses listed below. Examples of four course credit study lists are as follows: (1) Botany/Zoology 167, either Zoology 169L or Biochemistry 245L, two seminars, and Independent Study; (2) Botany/Zoology 167, Zoology 169L, Biochemistry 245L, and two seminars; (3) Botany/Zoology 167, Economics 138, Economics 149, and two seminars. Juniors and seniors are encouraged to choose Independent Study.

Analysis of Marine Ecosystems. (Botany 167 or Zoology 167.) Major marine ecosystems, the physical and biological characteristics of each as a functional entity. Lectures and discussion. Prerequisites: introductory biology and chemistry. One course. *Barber*

Organization of Marine Communities. (Zoology 169L.) Dynamics of marine communities in the context of current ecological theory. Life history strategies, competition, predation, diversity, and stability; detailed considerations of benthic and pelagic communities. Students may not receive credit for both Zoology 103L and 169L. Prerequisites: introductory biology and mathematics. One course. *Sutherland*

Macromolecules, Ecology and Evolution. (Biochemistry 245L.) The structure and function of protein and nucleic acid molecules with particular emphasis on the application of molecular techniques to questions in ecological, systematic, and evolutionary theory. One course. *Sullivan*

Economic Statistics. (Economics 138.) Survey of principal concepts and methods of application to economics. (Not open to students who have had Mathematics 53 or 117 or Management Sciences 110 or Psychology 117.) One course. *Wallace*

Microeconomic Theory. (Economics 149.) Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. Prerequisites: Economics 2 or 52 and Mathematics 31. (Not open to students who have had Public Policy Studies 110.) C-L: Canadian Studies. One course. *Wallace*

Light in the Sea. (Botany 195S.04.) Properties of light in the sea and the biological consequences; orientation, bioluminescence, biological rhythms, primary production, and sensing devices. Half course. *Ramus*

Membrane Physiology. (Physiology 219S.) Principles of membrane transport, electrophysiology, and osmoregulation. Lecture and discussion includes: membrane composition and structure; water, nonelectrolyte and ion transport, model membranes and reconstitution; mechanisms of cell volume and turgor pressure regulation; water and electrolyte transport through epithelia; hormonal and metabolic regulation of membrane transport; ionic and osmotic regulation in aquatic plants and animals. Half course. *Gutknecht*

Independent Study. (Biochemistry 209, Botany 191, or Zoology 191.) For seniors and juniors with consent of the appropriate Director of Undergraduate Studies and the supervising instructor. One course. *Staff*

Graduate Program

Graduate students from any and all academic disciplines are encouraged to take professional training at the Marine Laboratory. The program operates year-round,

*Tentative dates.

providing course work in the marine sciences, an active seminar program, and facilities supporting dissertation research. Resident graduate students represent the Departments of Biochemistry, Botany, Forestry and Environmental Studies, Geology, Physiology, and Zoology. Ordinarily, dissertation advisers are resident as well, although this need not be the case. The Marine Laboratory has available three full-time instructional assistantships and a number of summer assistantships for graduate student support. In addition, tuition credits obtained from fellowship support may be applied to courses given both at the Marine Laboratory and the Durham campus, regular semesters and summer terms. Students are admitted to degree programs in regular academic departments, not the Marine Laboratory. Generally, degree requirements, excepting dissertation research, are met on the Durham campus, then students take residence at the Marine Laboratory for dissertation research.

Marine Sciences Education Consortium (MSEC)

The Marine Sciences Education Consortium (MSEC) was developed to provide a formal curriculum in the marine sciences, including supervised research, to member institutions. Such institutions are liberal arts colleges or universities attended by students who are preparing for careers in the marine sciences or who have a strong liberal arts interest in the oceans but for whom no specialized programs in the marine sciences are available. Duke University has developed the specialized coastal physical plant, vessels, equipment, library, and faculty necessary to implement such programs. MSEC students have access to the spring and fall semester programs in marine sciences as well as the summer program here at the Duke Marine Laboratory, including room/board facilities. Currently, member institutions include Denison University, Furman University, Gettysburg College, Hood College, Juniata College, North Carolina State University, Presbyterian College, Trinity College, and Wittenberg University.

Members join upon invitation and mutual agreement. Inquiries from interested institutions are welcome and requests to join the MSEC will be considered. Such inquiries should be addressed to the Assistant Director for Academic Programs, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Visiting Scholar Programs

The exchange of knowledge is kept lively by several programs which bring distinguished scientists/educators to the Marine Laboratory. The Visiting Scholar Program brings lecturers for a period of several days on a monthly basis year-round. The Cocos Foundation brings visitors for longer periods of time, usually five weeks and only during the summers. The scholars, while in residence, lecture to the community at large as well as enrich specific research groups.

Requirements and Procedures

Spring and Fall Semester—Undergraduate Marine Sciences Programs. During the spring and fall semesters interdisciplinary programs in marine sciences provide an opportunity for undergraduate students to live and study at the Marine Laboratory. The programs are open to qualified sophomore, junior, and senior students. In the case of Duke students, participation in both the spring and fall semesters is possible only with the consent of their departmental adviser.

Duke students can obtain the appropriate application form from the back of this bulletin, the Director of Undergraduate Studies in their major department, or by writing to the Marine Laboratory. Duke students should submit the completed application. Non-Duke students should submit the appropriate application form (contained toward the back of this bulletin), one letter of recommendation from academic faculty,

and a current transcript of academic work. All completed applications and supporting credentials, if required, (from all applicants) should be received prior to the preceding 31 October (for spring semester 1985) and the preceding 19 March (for fall semester 1985) by the Admissions Office of the Marine Laboratory. (Applications received after these dates will be considered on a space-available basis.) Students will be notified of the action of the Admissions Committee shortly after each deadline.

Summer Terms. Introductory level courses (numbered below 100) offered during the summer at the laboratory are open to all qualified college students; advanced level courses (numbered 100 to 199) are intended for undergraduate students from the sophomore to the senior level; senior-graduate level courses (numbered from 200 to 299) are intended for advanced undergraduates and graduate students (juniors and well-qualified sophomores may enroll in these courses with special permission). Undergraduates may not enroll in 300-level courses.

The application (found at the back of this bulletin) and current transcripts (in the case of those who are applying to courses numbered 100 or above) should be submitted by all applicants to Admissions, Duke University Marine Laboratory as early as possible to allow for adequate processing time and to assure a space in the desired course(s). Late applicants will be considered if space permits. All applicants will be notified by mail as promptly as possible after a decision has been reached concerning their application. Upon acceptance, payment of required deposit(s) is essential to reserve space in a course as well as room/board accommodations.

Students wishing to apply summer credits toward an advanced degree at Duke University must, in addition to filling in the application blank, register with the Duke University Graduate School. Students who have had adequate preparation and approval of their major professor may request space for independent or thesis research.

Summer Credit. The summer session term credit does not mean degree credit at Duke University unless the student has been admitted as a degree candidate by one of the colleges or schools of the University. Other students will be categorized as nondegree (unclassified) students for the summer only. A student taking a course for credit is expected to do all the work required and to take the final examination, and will receive a grade.

Summer Minimum Enrollment. Some courses are offered subject to minimum enrollments. In withdrawing a course not having adequate enrollment, every effort will be made to place the student in an alternate course which has been listed by the student as a second choice.

Summer Maximum Program Load. The maximum load for one term of the summer session at the Marine Laboratory is a one and one-half course (or 6 graduate unit) program (semester hour equivalents are listed under the course descriptions). A greater load may be possible only with the approval of the student's Dean or the appropriate Director of Graduate Studies. Non-Duke students must obtain approval from the Director of the Summer Session.

Financial Information

Figures quoted in this section are projections and may be subject to change in many cases without prior notice. All rates, excluding tuition, student health and student activity fees, are effective 7 May 1984 to 30 April 1985.

SPRING AND FALL SEMESTER—UNDERGRADUATE MARINE SCIENCES PROGRAMS

Tuition. Tuition for the spring semester will be \$3,690. Information regarding tuition for the fall semester will be available at a later date. (See also section on payment of tuition and fees.)

Health Fee. Students are required to pay \$90 for the spring semester. Information regarding the health fee for the fall semester will be available at a later date.

Student Activity Fee. The student activity fee for the spring semester will be \$41.30. Information regarding the student activity fee for the fall semester will be available at a later date.

Room and Board. The total room and board fee for the spring semester will be \$1,875. Information regarding the room and board fee for the fall semester will be available at a later date.

All dormitory occupants must supply their own linens, blankets, and towels, but pillows will be furnished. If a key is desired, a key deposit of \$10 (per semester) will be charged each person occupying a room. This deposit will be refunded at time of departure and return of key.

Full board provides for three meals a day, Monday through Saturday, and breakfast and dinner on Sunday. No credit will be allowed for meals that are missed.

Estimated Semester Costs. Estimated costs for the spring semester will be: tuition—\$3,690; health fee—\$90; student activity fee—\$41.30; room and board—\$1,875. Estimated costs for the fall semester will be available at a later date. Books, if required by the instructor, will be available at registration.

Payment of Tuition and Fees. The Office of the Bursar (Duke University, Durham Campus) will issue invoices to registered students for tuition, fees, and other charges approximately four to six weeks prior to the beginning of classes each semester. The *total amount due* on the invoice is payable by the invoice due date which is normally one week prior to the beginning of classes. A student is required to pay all invoices as presented. No deferred payment plans are available. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. (Duke University students on the Tuition Prepayment Plan will be billed accordingly.) Payments should be sent to the address indicated on the invoice and not to the Duke Marine Laboratory.

Late Payment Charge. If the *total amount due* on an invoice is not received by the invoice due date, a penalty charge will be assessed from the billing date of that invoice. The penalty charge will be at an annual rate of 16 percent applied to the *past due balance* on the invoice. The *past due balance* is defined as the previous balance less any payments and credits received on or before the due date and also any student loan memo credits, related to the previous balance, which appear on the invoice.

SUMMER TERMS

Tuition. The following are tuition charges for summer registration.

1. Undergraduate students: \$642 for each nonlaboratory or 3 semester hour (s.h.) course; \$856 for each undergraduate laboratory or 4 s.h. course; \$428 for each half-course (2 s.h.); and \$1,284 for each one and one-half course (6 units) program (6 s.h.) offered at the Duke University Marine Laboratory.
2. Graduate students: \$214 per unit (s.h.). For an undergraduate course, the tuition rate indicated in section 1 above is applicable.

Auditing Fees.

1. With permission of the instructor and the Director, students registered for a full program (6 s.h.) may audit courses. No extra charge is made.
2. Students carrying less than a full program (6 s.h.) may be granted permission by the instructor and the Director to audit a course, but must pay half the University fee for the course.



Health Fee. Students are required to pay an estimated \$25 per term.

Room and Board. Total charges for room and board are estimated at \$675 per term or higher. More definitive information will be available at a later date.

Air-conditioned dormitory rooms are available. (Upon acceptance in a course, students will be sent an acceptance and reservation form. Reservation for housing and board should be made on this form and the form promptly returned to the Marine Laboratory along with the room and board reservation deposit, if the student elects to utilize room and board.)

Occupants must supply their own linens, blankets, and towels, but pillows will be furnished.

Full board provides for three meals a day, Monday through Saturday, and breakfast and dinner on Sunday. There will be no credit allowed for missed meals.

Deposits.

1. **Course Deposit.** Upon acceptance in a course, a nonrefundable deposit of \$50 (per course) is required to ensure a reservation in that course. If the student properly registers for the course and attends, the deposit will be credited to tuition.
2. **Room and Board Deposit.** A \$50 deposit (per term) is required to ensure a reservation for room and board. If the student properly registers, the deposit will be credited to the room and board charge. The deposit is refundable if a student who has previously made a room and board reservation properly withdraws from a course prior to the beginning of the term. *The deposit is nonrefundable if a student who has previously made a room and board reservation at the Marine Laboratory subsequently decides not to utilize the room and board facilities (although he or she still plans to attend the course) and does not notify the Marine Laboratory at least two weeks prior to the beginning of the term.*
3. **Key Deposit.** If a key is desired, a key deposit of \$10 per term will be charged each person occupying a dormitory room. This deposit will be refunded at time of departure and return of the key.

Estimated Term Costs. Estimated costs for each of the summer terms will be: tuition—(see tuition section); student health fee—\$25; room and board—about \$675 or higher. Books, if required by the instructor, will be available at registration.

Payment of Tuition and Fees. Duke University Marine Laboratory does not mail statements for summer term tuition and fees. All tuition and fees must be paid to the Accounting Office (Duke University Marine Laboratory, Beaufort, North Carolina 28516) at least three full working days prior to the first day of class (the first day of each term). Checks should be made payable to Duke University Marine Laboratory and may be mailed to the above address. *Failure to pay tuition and fees by the end of the drop/add period (the first three days of classes in any term) will result in administrative withdrawal of the student.* Withdrawn students may not attend class or subsequently be registered for the term. Students who are unable to meet these deadlines should consult with the Accounting Office prior to the deadline.

Late Payment Charge. A late registration fee of \$25 will be charged in accordance with Duke University policy unless registration is completed and all fees paid prior to the first day of the term.

TRANSCRIPTS

Requests for transcripts of academic records should be directed to the Associate Registrar, Office of the Registrar, 103 Allen Building, Duke University, Durham, North Carolina 27706. Ten days should be allowed for processing. A fee of \$1, payable in



advance, is charged for each copy. Such requests should not be directed to the Marine Laboratory.

REFUNDS

Spring and Fall. In the case of withdrawal from the University, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

<i>Withdrawal</i>	<i>Refund</i>
Before classes begin	Full amount
During first or second week	80 percent
During third, fourth, or fifth week	60 percent
During sixth week	20 percent
After sixth week	None

Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward. In addition to tuition, the schedule also applies to other Marine Laboratory fees. In the event of death, a full tuition and fees refund will be granted.

Summer Terms—Withdrawal Charge and Refund of Tuition and Fees. *Students who will not be attending a summer term or course for which they have been officially accepted must drop the course(s) prior to the first day of class, even if they have not paid tuition and fees. Failure to drop the course(s) will result in administrative withdrawal at the end of the first three days of the term and billing of the student for twenty percent of the tuition plus the health fee. If tuition and fees have been paid, the following refund policies apply:*

1. When applications for withdrawal or drops from a course or term are received by the Admissions Office of the Duke University Marine Laboratory before the first class day of a given term, full tuition and fees will be refunded.
2. When applications for withdrawal or drops from a course or term are received by the Admissions Office of the Duke University Marine Laboratory during the first three class days of a given term, 80 percent of the tuition and the room and board fee will be refunded. The health fee will not be refunded. There will be no charge for drops and adds which result in no change in tuition.
3. When applications for withdrawal or drops from a course or term are received by the Admissions Office of the Duke University Marine Laboratory after the third class day, there will be no refund of tuition and fees.

CHECK CASHING

The banks in the Beaufort-Morehead City area have indicated that they will not cash personal checks for students unless they are guaranteed. Therefore, it is recommended that students who come to the laboratory bring with them sufficient travelers' checks, money orders, certified checks (which the banks will cash), or cash to cover personal expenses.

Financial Assistance

Duke University Marine Laboratory Summer Tuition Scholarships. Up to twenty summer tuition scholarships will be awarded on a competitive basis. Awards require that the student live on campus, i.e., take room and board at Duke University Marine Laboratory. In addition to the summer application which has already been submitted by the student, the following credentials will be required to complete the scholarship application: (1) academic transcript(s), if not already submitted as part of the summer

application, (2) a statement of purpose for taking the particular course and, (3) one letter of recommendation from academic faculty. Intent to apply for a scholarship should be made known in writing (no separate application blank is utilized for scholarship purposes) and received by the Admissions Office of the Marine Laboratory, along with all supporting credentials, no later than 1 April 1985. Announcements of scholarship award will be made by mail shortly thereafter.

Bookhout Scholarship. The Bookhout Scholarship provides financial assistance to juniors, seniors, or beginning graduate students with a professional interest in the natural sciences. Aid is provided solely for summer term courses taken at the Duke University Marine Laboratory. Recipients will be chosen for academic excellence, the scope of preparation, and experience. Applicants will be required to submit the same credentials as stated for the Duke University Marine Laboratory Summer Tuition Scholarships (see above). The deadline will also be the same.

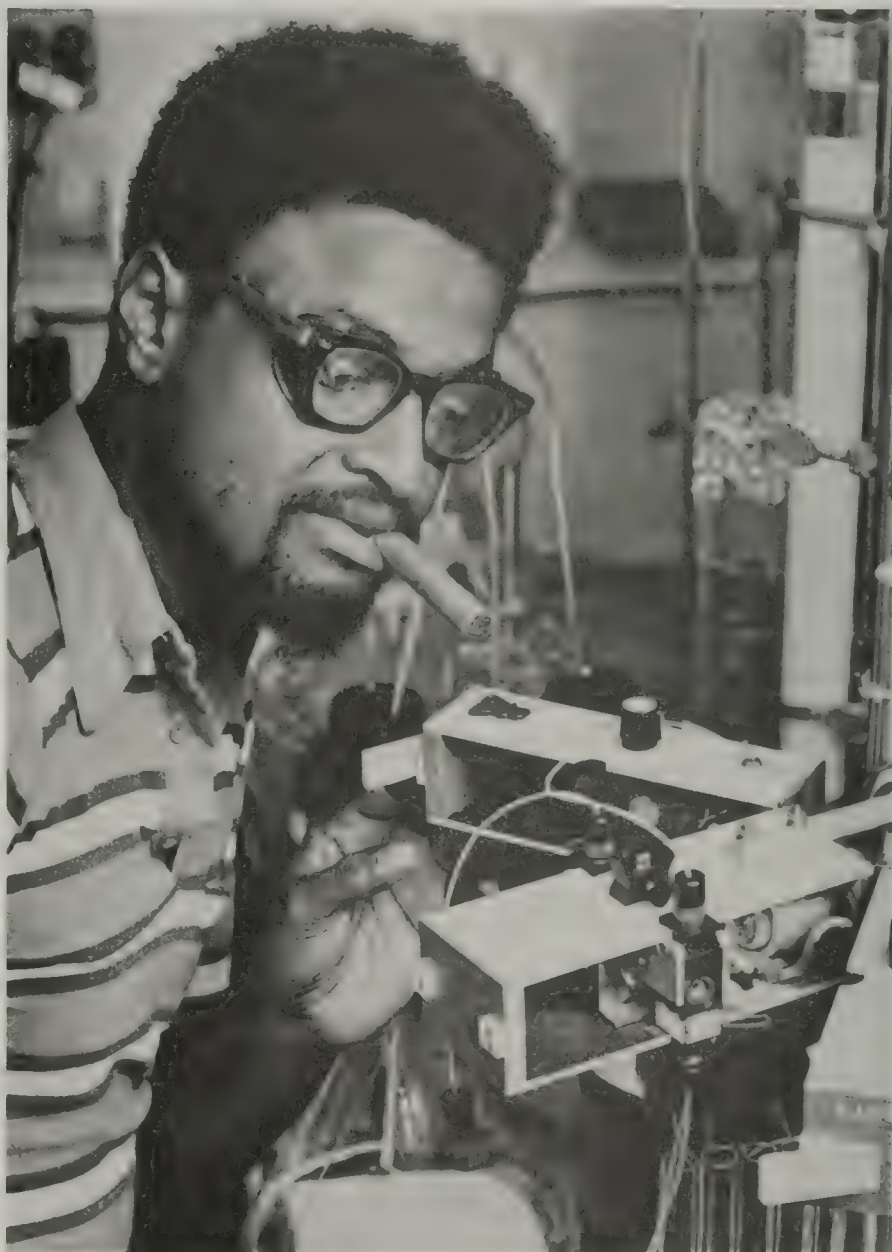
Deborah Susan Steer Memorial Scholarship in Marine-Life Sciences. Each year the income from the fund will be used to provide financial assistance to promising Duke undergraduates who wish to study marine life-sciences at the Duke University Marine Laboratory. Priority will be given to students in the summer session. Application must be made and supporting credentials received by the Admissions Office of the Marine Laboratory no later than 1 April 1985. Additional information is available from the Admissions Office of the Marine Laboratory upon request.

Instructional Assistantships. Three graduate student instructional assistantships will be available during the period of September 1985 through May 1986. Students registered in a graduate program in any department in the sciences at Duke University may apply. Recipients must be in residence at Beaufort during the period of their appointment and also conduct, or plan to conduct, their research at the Duke University Marine Laboratory in Beaufort.

Applications must be received by the Assistant Director for Academic Programs on, or before, 28 February 1985. Applicants will be judged on the basis of need, qualifications for the courses in which they will assist, and previous teaching and graduate experience. A student may receive a maximum of three years' support under the program.

For further information, write the Assistant Director for Academic Programs, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Resources for Study and Research



Research Staff and Their Programs

Dr. Richard T. Barber. Biological Oceanography.

The variability of productivity and trophic structure of ocean ecosystems is being studied in the Equatorial Pacific between South America and the international date line. This work also involves long-term study of the coastal ocean involving shore stations in Peru, Ecuador, and the Galapagos Islands.

Barber, R. T.; Zuta, S.; Kogelschatz, J.; and Chavez, F. 1983. Temperature and nutrient conditions in the eastern equatorial Pacific, October 1982. *Trop. Ocean-Atmosphere Newslett.* 16:15-17.

Barber, R. T., and Chavez, C. F. 1983. Biological consequences of *El Nino*. *Science* 222:1203-1210.

Barber, R.T.; Whaling, P. J.; and Cohen, D. M. 1984. Mercury in recent and century-old deep sea fish. *Environ. Sci. Technol.* (in press.)

Drs. Joseph Bonaventura and Celia Bonaventura. Biochemical Adaptations of Organisms to the Marine Environment.

Marine organisms are found in environments characterized by great diversity in temperature, pH, salinity, oxygen availability, etc. Through biochemical studies the structural and functional diversity of these organisms and their environments is being shown to be paralleled by diversity at the molecular level. The respiratory proteins of marine organisms are being studied in order to increase the understanding of molecular adaptations and the mechanisms which give rise to functional flexibility. Investigations include measurements of the kinetics and equilibria of ligand binding to hemoglobins, hemocyanins, and cytochrome *c* oxidase with emphasis on the reactivity of these proteins as regulated by metabolic effectors. The subunit interactions involved in assembly of giant hemocyanin molecules are also under investigation. These studies are complemented by work in the Protein Engineering and Technology Laboratory where properties of chemically modified, crosslinked, and immobilized forms of biologically active molecules are characterized.

Bonaventura, C., and Bonaventura, J. 1983. Respiratory pigments: Structure and function. In *The Mollusca: Environmental Biochemistry and Physiology*, ed. K. Wilbur, vol. 2, pp. 1-50. New York: Academic Press.

Brenowitz, M.; Bonaventura, C.; and Bonaventura, J. 1983. Assembly and calcium-induced cooperativity of *Limulus* IV hemocyanin: A model system for analysis of structure-function relationships in the absence of subunit heterogeneity. *Biochemistry* 22:4707-4713.

Bickar, D.; Bonaventura, J.; Bonaventura, C.; Auer, H.; and Wilson, M. 1984. Paradoxical effects of methylmercury on the kinetics of cytochrome c oxidase. *Biochemistry* 23:680-684.

Johnson, B. A.; Bonaventura, C.; and Bonaventura, J. 1984. Allosteric modulation of *Callinectes sapidus* hemocyanin by binding of L-lactate. *Biochemistry* 23:872-878.

Dr. C. G. Bookhout. Larval Ecology and Larval Development of Invertebrates.

This laboratory investigates the effects of pollutants, such as insecticides and drilling fluids, on the complete development of mud-crabs and blue crabs. Also, a study of the development of the family of crabs to which the blue crab belongs is being conducted.

Bookhout, C. G.; Costlow, J. D.; and Monroe, R. 1980. Kepone* effects on larval development of mud-crab and blue crab. *Water Air Soil Pollut.* 13:57-77.

Bookhout, C. G.; Monroe, R. J.; Forward, R. B., Jr.; and Costlow, J. D., Jr. 1984. Effects of soluble fractions of drilling fluids on development of crabs, *Rhithropanopeus harrisii* and *Callinectes sapidus*. *Water Air Soil Pollut.* 21:183-197.

Bookhout, C. G.; Monroe, R. J.; Forward, R. B., Jr.; and Costlow, J. D., Jr. 1984. Effects of hexavalent chromium on development of crabs, *Rhithropanopeus harrisii* and *Callinectes sapidus*. *Water Air Soil Pollut.* 21:199-216.

Dr. Marius Brouwer. Biochemistry of Respiratory and Metal-binding Proteins.

(1) Basic studies on the mechanism of oxygen binding by large respiratory proteins. (2) Determination of whether hemocyanins, hemoglobins, or red blood cells act as carriers or targets in trace metal toxicity in marine invertebrates and fish. (3) Characterization of structure and function of trace metal-binding proteins in marine fish and shellfish.

Brouwer, M.; Bonaventura, C.; and Bonaventura, J. 1982. Heavy metal ion interactions with *Callinectes sapidus* hemocyanin: Structural and functional changes induced by a variety of heavy metal ions. *Biochemistry* 21:2529-2538.

Brouwer, M.; Bonaventura, C.; and Bonaventura, J. 1983. Metal ion interactions with *Limulus polyphemus* and *Callinectes sapidus* hemocyanin: Stoichiometry and structural and functional consequences of calcium (II), cadmium (II), zinc (II) and mercury binding. *Biochemistry* 22:4713-4723.

Brouwer, M.; Brouwer-Hoexum, T.; and Engel, D. W. 1984. Cadmium accumulation by the blue crab, *Callinectes sapidus*: Involvement of hemocyanin and characterization of cadmium-binding proteins. *Mar. Environ. Res.* 14:71-88.

Engel, D. W., and Brouwer, M. 1984. Cadmium-binding proteins in the blue crab, *Callinectes sapidus*: Laboratory-field comparison. *Mar. Environ. Res.* 14:139-151.

Dr. Robert Cashon. Effect of Metabolic Intermediates on Hemoglobin Function.

Being investigated are the effects of metabolites on the oxygen binding properties of normal and abnormal human hemoglobins and on fish hemoglobins.

Cashon, R. 1981. The Malate Dehydrogenase Isozymes and Allozymes of *Funulus heteroclitus*. The Johns Hopkins University Ph.D. dissertation.

Focesi, A.; Cashon, R.; Bonaventura, C.; and Bonaventura, J. 1983. Allosteric interactions of nicotinamide nucleotides and EDTA with human hemoglobin. *Fed. Proc.* 42:2030.

Dr. John D. Costlow. Crustacean Development.

Much of the research in developmental biology deals with the culture of invertebrate larvae under controlled conditions in the laboratory, from hatching until the juvenile stages are reached. The availability of numerous larvae of known species, age, and stage of development has led to studies on the extent to which environmental factors within the marine environment affect rates of development, survival, and

morphological abnormalities. In addition to studying the effects of natural environmental factors, research is under way to determine the effects of pollutants on larval development of marine crustacea. The developmental biology program also includes studies on the physiology of crustacean larvae and the factors involved in regulation of molting, rate of development, and metamorphosis during larval development.

Costlow, J. D. 1982. Impact of toxic organics on the coastal environment. In *Impact of Man on the Coastal Environment*, ed. T. W. Duke, EPA-600/8-82-021, pp. 86-95.

Freeman, J., and Costlow, J. D. 1983. Endocrine control of spine epidermis resorption during metamorphosis in crab larvae. *Roux's Arch. Dev. Biol.* 192:362-365.

Costlow, J. D., and Tipper, R. C., eds. 1984. Marine biodeterioration: An interdisciplinary study. In *Proceedings of the Symposium on Marine Biodeterioration*, Uniformed Services, University of Health Sciences, 20-23 April 1981, 408 pp. Copyright® 1984 U.S. Naval Institute Press, Annapolis, Maryland.

Dr. David Evans. Marine Chemistry.

The environmental chemistry of heavy metals in estuarine and coastal environments is being investigated, especially chemical factors which influence the biological availability of metals to marine organisms.

Evans, D. W.; Cutshall, N. H.; Cross, F. A.; and Wolfe, D. A. 1977. Manganese cycling in the Newport River estuary, North Carolina. *Estuarine Coastal Mar. Sci.* 5:71-80.

Evans, D. W.; Wiener, J. G.; and Horton, J. H. 1980. Trace element inputs from a coal burning powerplant to adjacent terrestrial and aquatic environments. *J. Air Pollut. Control Assoc.* 30(5):567-573.

Evans, D. W.; Alberts, J. J.; and Clark, R. A., III. 1983. Reversible ion-exchange fixation of cesium-137 leading to mobilization from reservoir sediments. *Geochim. cosmochim. Acta* 47:1041-1049.

Evans, D. W., and Laughlin, R. B., Jr. 1984. Accumulation of bis(tributyltin) oxide by the mudcrab, *Rhithropanopeus harrisi*. *Chemosphere* 13:213-219.

Dr. Richard B. Forward, Jr. Physiological Ecology.

This laboratory investigates the behavior and physiology of estuarine and coastal zooplankton. This includes the photobehavior, photophysiology, biological rhythms, diurnal vertical migration, and horizontal migration of crustacean larvae. Past students have worked with crustaceans and chaetognaths on the effects of temperature, salinity, and feeding on phototaxis and geotaxis, salinity perception, polarized light perception, and field studies of horizontal and vertical distributions as related to environmental factors.

Forward, R. B., Jr., and Lohmann, K. J. 1983. Control of egg hatching in the crab *Rhithropanopeus harrisi* (Gould). *Biol. Bull.* 165:154-166.

Forward, R. B., Jr.; Cronin, T. W.; and Stearns, D. E. 1984. Control of diel vertical migration: Photoresponses of a larval crustacean. *Limnol. Oceanogr.* 29:146-154.

Dr. John Gutknecht. Membrane Physiology and Osmoregulation.

This laboratory studies the mechanisms and functions of solute and water transport through biological membranes and synthetic phospholipid bilayer membranes. Some of the specific questions sought include the following: (1) How do heavy metals, e.g., Hg and Cd, permeate biological membranes? (2) What is the mechanism of action of thiocyanate and other drugs on the gastric mucosa? (3) How do water and small nonelectrolytes traverse biological membranes? (4) What is the proton and hydroxyl ion permeability of lipid bilayer membranes? (5) What are the rate limiting steps in weak acid/base transport through membranes?

Gutknecht, J. 1981. Inorganic mercury transport through lipid bilayer membranes. *J. Membr. Biol.* 61:61-66.

Gutknecht, J., and Walter, A. 1982. SCN^- and HSCN transport through lipid bilayer membranes: A model for SCN^- inhibition of gastric acid secretion. *Biochim. Biophys. Acta* 685:233-240.

Dr. Irving Hooper. Protein Immobilization and Biologically Active Marine Products.

Efforts here are focused on novel methods of incorporating proteins or other materials into a solid matrix to obtain both high concentration and full retention of activity. Also investigated is the use of these immobilized materials in carrying out biochemical conversions with high efficiency and rapid conversion rates.

As examples of chemical communication in the marine environment, we are investigating compounds produced by various estuarine animals which either promote or deter the settlement of barnacle larvae.

Bonaventura, C.; Bonaventura, J.; Hooper, I. R.; and Marshall, T. 1984. Underwater life support based on immobilized oxygen carriers. *Appl. Biochem. Biotechnol.* 9:65-80.

Dr. Thomas C. Johnson. Geological Oceanography.

Research involves deep-sea sedimentation studies in the western North Atlantic and the application of oceanographic techniques to the study of sedimentation in large lakes. Present emphasis is upon Pleistocene paleocurrent studies and high-resolution seismic reflection profiling, side-scan SONAR, and sediment core analyses in Lake Superior, United States, and Lakes Tanganyika and Malawi, East Africa.

Johnson, T. C. 1984. Sedimentation in large lakes. *Ann. Rev. Earth Planet. Sci.* 12:179-204.

Halfman, J. D., and Johnson, T. C. 1984. Enhanced atmospheric circulation over North America during the early Holocene: Evidence from Lake Superior. *Science* 224:61-63.

Dr. William W. Kirby-Smith. Marine Ecology.

Research includes: (1) A synthesis of research done in the Newport River Estuary and a characterization of this estuarine system; and (2) Growth of suspension feeders in relation to the quantity and quality of food available.

Kirby-Smith, W. W., and Barber, R. T. 1974. Suspension feeding aquaculture systems: Effects of phytoplankton concentration and temperature on growth of the bay scallop. *Aquaculture* 3:135-145.

Burle, E., and Kirby-Smith, W. 1979. Growth of the bay scallop, *Argopecten irradians* fed an artificial diet rich in protein. *Estuaries* 2:206-208.

Dr. Kenneth R. McKaye. Behavior and Community Ecology of Fishes.

The research centers upon the evolution, behavior, and community ecology of fishes. Emphasis is upon the manner in which behavior modifies competitive and mutualistic interactions in fish communities and involves studies of altruism, optimal foraging, predator-prey interactions, and territoriality. The two systems that Dr. McKaye is studying in greatest detail are the estuarine fishes of North Carolina and the cichlid fish community of Lake Malawi, Africa. This Rift Valley lake is the most species rich lake in the world and contains more species of fish than the entire western North Atlantic. The ultimate goal of the cichlid research is to explain both the community organization of this highly complex community of closely related species and the manner by which such explosive speciation may be occurring. The estuarine research is focused upon the behavior and ecology of juvenile fishes and the predators which consume them.

McKaye, K. R. 1984. Behavioral aspects of cichlid reproductive strategies: Patterns of territoriality and brood defense in Central American substratum spawners and African mouth brooders. In *Fish Reproduction*, ed. G. Potts, pp. 245-273. New York: Academic Press.

McKaye, K. R., and Marsh, A. 1983. Food switching by two algae-scraping cichlid fishes in Lake Malawi, Africa. *Oecologia* 56:245-248.

McKaye, K. R., et al. 1984. Genetic evidence for allopatric and sympatric differentiation among color morphs of a Lake Malawi cichlid fish. *Evolution* 38:215-219.

Dr. Joseph S. Ramus. Algal Ecological Physiology.

The present focus of study is the physical forcing of primary productivity in a coastal plains estuary characterized by high flushing rates and variable nutrient inputs. To do so requires time-intensive sampling on the estuary—including selected hydrology, water chemistry, meteorology, and productivity parameters. Ultimately, the research seeks a match between species specific physiological response and the temporal frequency of nutrient availability, the phasing of the organism with its environment.

Ramus, J. 1982. Engelmann's theory: The compelling logic. In *Synthetic and Degradative Processes in Marine Macrophytes*, ed. L. Srivastava, pp. 29-46. Berlin: Walter de Gruyter & Co.

Ramus, J., and van der Meer, J. P. 1983. A physiological test of the theory of complementary chromatic adaptation. I. Color mutants of a red seaweed. *J. Phycol.* 19:86-91.

Dr. Daniel Rittschof. Chemical Ecology.

(1) Basic studies of the chemical nature and functions of substances indicating prey and nonprey resource location. (2) Contact chemoreception, chemical induction, and inhibition of barnacle settlement. (3) Isolation and purification of native bioactive molecules. (4) Nontoxic repellants.

Rittschof, D.; Williams, L. G.; and Shepherd, R. 1984. Preliminary characterization of a chemical attractant of the oyster drill *Urosalpinx cinerea*. *J. Chem. Ecol.* 10(1):63-80.

Rittschof, D.; Kieber, D.; and Merrill, C. L. 1984. Modification of behavioral response thresholds of newly hatched snails by prey odor exposure during development. *Chem. Sens.* (In press.)

Rittschof, D.; Branscomb, E. S.; and Costlow, J. D. 1984. Settlement and behavior in relation to flow and surface in larval barnacles, *Balanus amphitrite*. *J. Exp. Mar. Biol. Ecol.* (In press)

Branscomb, E. S., and Rittschof, D. 1984. An investigation of low frequency sound waves as a means of inhibiting barnacle settlement. *J. Exp. Mar. Biol. Ecol.* (In press.)

Dr. Brenda Sanders. Stress Physiology.

An understanding of the biological effects of trace metals on an ecosystem requires the integration of responses at each level of biological organization. A major objective of this research is to develop an approach which allows such integration. The primary impact of trace metals occurs initially at the molecular level and propagates upward in a mechanistic and predictable fashion through increasingly higher levels of biological organization to effects on the organism, population, and community.

The biochemical and physiological processes which allow organisms to sequester, metabolize, compartmentalize, and excrete metals are collectively involved in detoxication. Organisms have a finite detoxication capacity which represents their biochemical limits of tolerance. To determine the ecological impact of metals, however, these cellular responses must be related to processes which affect the population, such as growth and reproduction. Therefore, we seek to establish a link between specific biochemical responses to metals and effects on organismal growth.

Sanders, B. 1983. Insulin-like peptides in the lobster *Homarus americanus*. I. Insulin immunoreactivity. *Gen. Comp. Endocrinol.* 50:366-373.

Sanders, B. M.; Jenkins, K. D.; Sunda, W. G.; and Costlow, J. D. 1983. Free cupric ion activity in seawater: Effects on metallothionein and growth in crab larvae. *Science* 222:53-55.

Sanders, B.; Laughlin, R.; and Costlow, J. D. 1984. Growth regulation in larvae of the mud crab, *Rhithropanopeus harrisii*. In *Crustacean Issues*, vol. 2, *Crustacean Growth*, ed. A. M. Wenner. (In press.)

Jenkins, K. D.; Sanders, B.; and Sunda, W. G. 1983. Metal regulation and toxicity in aquatic organisms. In *Biochemical Mechanisms of Drug and Toxin Action*, eds. Singer, Mansour, and Ondarza, pp. 277-287.

Dr. Richard B. Searles. Seaweed Systematics.

Biology of seaweeds with emphasis on systematics, ecology, and biogeography of tropical algae from North Carolina and the Caribbean.

Searles, R. B. 1980. The strategy of the red algae life history. *Am. Nat.* 115:113-120.

Searles, R. B. 1983. Vegetative and reproductive morphology of *Dudresnaye georgiana* sp. nov. (Rhodophyta, Dumontraieae). *Phycologia* 22:309-316.

Peckol, P., and Searles, R. B. 1983. Effects of seasonality and disturbance on population development in a Carolina continental shelf community. *Bull. Mar. Sci.* 33(1):67-86.

Dr. J. Bolling Sullivan. Comparative Protein Biochemistry.

The primary emphasis in the biochemical studies involves research on the structure, function, and evolution of protein molecules. Proteins, especially those involved in the transport of molecular oxygen (hemoglobin, hemocyanin, chlorocruorin, and hemerythrin), are being isolated and their structural and functional properties elucidated. These studies are intended to illustrate how protein molecules function, as well as how they have evolved. Studies of protein polymorphisms are intended to illustrate gene flow among populations and offer insights into the adaptive strategies of marine organisms.

Sullivan, B.; Pennell, L.; Hutchison, B.; and Hutchings, R. 1983. Genetics and evolution of the hemocyanin multigene. I. Genetic variability in *Uca pugilator* from Beaufort, N.C. *Comp. Biochem. Physiol.* 76:615-618.

Sullivan, B.; Miller, K.; Singleton, K.; Scheer, A. G.; and Williams, A. B. 1984. Electrophoretic analyses of hemocyanins from four species of mud crabs, genus *Panopeus*, with observations on the ecology of *P. obesus*. *Fish. Bull.* (In press.)

Dr. John Sutherland. Marine Ecology.

The research attempts to identify and understand the processes which result in the temporal and spatial patterns in species abundance in intertidal and subtidal, epibenthic communities. Changes in the adult populations are followed with point sampling and photographic techniques. The approach is experimental to the extent that species are removed or excluded from the community to assess their importance in community structure and function. This work was initiated with estuarine animal populations near Beaufort. Comparable work is now being done on the plant and animal populations in the rocky substrates of southern Chile and the Pacific coast of Central America.

Sutherland, J. P. 1981. The fouling community at Beaufort, North Carolina: A study in stability. *Am. Nat.* 118:499-519.

Moreno, C. A., and Sutherland, J. P. 1982. Physical and biological processes in a *Macrocystis pyrifera* community near Valdivia, Chile. *Oecologia* 55:1-6.

Dr. Joseph Ustach. Marsh Ecology.

Structure and functioning of wetlands, especially salt marshes, within the estuarine system. Major areas of interest are: primary production; decomposition; detritus formation and utilization; habitat utilization; microbial-meiofaunal interactions.

Ustach, J. F. 1982. Algae, bacteria and detritus as foods for the harpacticoid copepod, *Heteropsyllus pseudonunni* Coull and Palmer. *J. Exp. Mar. Biol. Ecol.* 64:203-214.

Heinle, D. R.; Flemer, D. A.; and Ustach, J. F. 1976. Contribution of tidal marshlands to mid-Atlantic estuarine food chains. In *Estuarine Processes*, ed. M. Wiley, pp. 309-320. New York: Academic Press.

Research Facilities

Visiting investigators may obtain research space throughout the year. Each research laboratory building is air-conditioned and equipped with running seawater through a P.V.C. system. There are tanks, water tables, aquaria, autoclaves, ovens, and plant presses. In addition to commonly used laboratory equipment, the following are available: refrigerated centrifuges, spectrophotometer, balances, pH meters, hoods, and constant temperature equipment. There is a complete sedimentological research laboratory that is equipped for state-of-the-art chemical and size analyses. The Marine Laboratory also maintains darkrooms, a well-equipped workshop, a stock room, and a purchasing department.

As a result of funds provided by the National Science Foundation, the following new research equipment and systems are available to visiting investigators at Duke Marine Laboratory as well as to resident research personnel: water purification system, spectrophotometer, camera, recorder and accessories, spectrofluorometers, power supply, M-Drive, CRT screens, and a printer for the Compupro computer.

In addition, the National Science Foundation has funded a number of general facility improvements such as renovations to the R/V *First Mate*, renovations to the seawater system, and updating the autoanalyzer to state-of-the-art equipment.

I. E. Gray Library-Auditorium. Located in the building are the 1,917 square feet auditorium, with stage, a library, the librarian's office, two seminar rooms, a receiving room, a kitchenette, and two closed carrels. The auditorium has a seating capacity of approximately 300 and is suitable for lectures, seminars, symposia, and small regional or national meetings. Inquiries concerning use of auditorium or seminar room space should be addressed to Personnel and Auxiliaries, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

The building houses the Pearse Memorial Library which contains about 53,000 catalogued reference books and journals, 155 current journals, and 23,000 reprints. There are also expedition reports in oceanography, a microfilm library of graduate student theses based on research at the laboratory, and a microfilm reader. Other materials may be obtained by special delivery system from the Perkins Library on the Durham campus or through the interlibrary loan service with other libraries in the United States.

Reference Collections. A reference collection of approximately 2,000 species of animals and macroalgae from estuaries and the continental shelf of North Carolina is available to students and research personnel. A library of monographs, identification guides, and checklists of marine organisms is maintained. The museum serves as a clearing house for information on natural history, providing visitors with access to information on identification and availability of local marine organisms.

Computing Facilities. The Marine Laboratory operates a Compupro System 8/16 computer for use by staff, students, and visiting investigators. The computer has 512K of memory and is operated under the MP/M 8/16 operating system. The BASIC, FOR-

TRAN, and Pascal programming languages are available, as well as application programs for word processing, statistical analysis, data base management, and graphics. A 20Mb hard disk drive and two eight-inch floppy disk drives are used for data storage. There are a variety of video terminals, graphics terminals, and printers and plotters.

R/V Cape Hatteras. The Duke/University of North Carolina Oceanographic Consortium operates a 131-foot research vessel, the R/V *Cape Hatteras*, a coastal zone research vessel. The ship operates primarily in the western North Atlantic, concentrating in the region between Nova Scotia and the Caribbean. The ship is a member of the academic research fleet supported by the National Science Foundation for the purpose of providing oceanographic research opportunities to investigators. Inquiries concerning use of the research vessel should be addressed to the Duke/UNC Oceanographic Consortium, Marine Laboratory, Duke University, Beaufort, North Carolina 28516.

Financial Information

Figures quoted in this section are projections and may be subject to change in many cases without prior notice. All rates are effective 7 May 1984 to 30 April 1985.

Room and Board Costs. All Duke University Marine Laboratory visitors who stay on the island will pay a room and board fee as follows: \$20 per day (1-6 days); \$125 per week (7+ days). Allowances will be made only for meals missed at the beginning and end of the stay.

Boat Rentals. The following boats are available at the laboratory for collecting and instructional activities. Charges apply to all research and teaching activities.

Boat Type	Charges
50 ft. cruiser/trawler (<i>First Mate</i>)*	\$40 per hour
20 ft. outboard runabouts	\$20 per hour
16 ft. outboard runabout	\$12 per hour
Outboard skiffs	\$4 per hour

These rates are intended to partially defray the cost of operating and maintaining these boats.

Most of these boats may be scheduled by visiting researchers through the maintenance office; however, first priority must be given to classes when they are in session. Use of Duke University Marine Laboratory vessels for any sponsored research will be subject to charges.

Research Space. Research space, including seawater tables, is available on a limited basis for Duke University Marine Laboratory visitors. Research space rent for all users is \$2.25 per square foot per month. Typical size of laboratory-office area is 100 square feet. Requests for laboratory space, office space, and/or seawater tables should be sent to Personnel and Auxiliaries, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Teaching Space. Various size classrooms are available throughout the year; however, first priority must be given to Marine Laboratory classes when they are in session. Cost for such space is \$25-\$35/day depending upon which laboratory is utilized. Requests for these teaching areas, including class needs such as seawater tables, collecting equipment, etc., should be sent to Personnel and Auxiliaries, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

*Crew required for safety of user and vessel.





APPLICATION FOR ENROLLMENT IN THE DUKE UNIVERSITY MARINE LABORATORY
UNDERGRADUATE MARINE SCIENCES PROGRAM

Please fill out completely; type or print.

Please specify: Spring Semester _____
Year _____

Date _____

Fall Semester _____
Year _____

1. Mr., Ms. _____
Last First Middle

2. Social Security Number _____

3. Date of Birth: Month _____ Day _____ Year _____

4. A. Current full mailing address:

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

B. Permanent or home full mailing address:

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

5. Name and full mailing address of parents or guardian:

Name _____ Relationship _____

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

6. DUKE STUDENT (only)

A. Trinity _____ Engineering _____ Other (specify) _____

B. Major _____

C. Class (e.g., junior, senior) at time of enrollment at DUML _____

D. Expected date of graduation _____

NOTE: Duke students must obtain the approval of their assigned departmental adviser on this application.

E. Adviser's signature _____ Date _____

7. NONDUKE STUDENT (Students from institutions other than Duke who are attending for the semester only and who will be classified as special, nondegree students)

A. Name and address of home institution:

City _____ State _____ Zip _____

B. Major _____

C. Class (e.g., junior, senior) at time of enrollment at DUML _____

D. Expected date of graduation _____

E. The following person has been requested to mail a letter of recommendation to the Admissions Office of the Duke University Marine Laboratory:

Name _____ Position _____

Institution _____

F. Transcript(s) will be sent by the following institution(s):

G. List courses currently in progress (which would not yet appear on a transcript):

H. Have you ever been placed on probation or suspended or dismissed from any school?

No ____ Yes ____ (If yes, please explain below.)

Mail Application to:

Admissions

**Duke University Marine Laboratory
Beaufort, North Carolina 28516**

Although this is not part of your official application and in no way will affect your application to the current program, we would consider it extremely helpful if you could provide us with the information requested below.

How did you learn about this program? _____

Has the program been adequately advertised? _____

Suggestions for better advertising: _____

APPLICATION FOR ENROLLMENT IN THE DUKE UNIVERSITY MARINE LABORATORY
SUMMER SESSION

Fill out completely; type or print.

Date _____

Mr., Ms. _____
Last First Middle

Date of Birth: Month _____ Day _____ Year _____

Social Security Number _____

Current full mailing address:

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

Permanent or home full mailing address:

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

Name and full mailing address of parents or guardian:

Name _____ Relationship _____

Street or P.O. Box _____

City _____ State _____ Zip _____

Telephone Number (including area code) _____

DUKE STUDENT

Undergraduate: Trinity _____ Engineering _____ Other (please specify) _____

Graduate: Grad. Sch. Arts & Sci. _____ Sch. Forestry & Env. Studies _____

Other (please specify) _____

Class (e.g., junior, 1st yr. M.S.) at time of enrollment at DUML _____

Expected date of graduation _____

Major _____

NONDUKE STUDENT (Attending Summer Session only)

Unclassified: Prebaccalaureate _____ Class (e.g., junior) _____

Postbaccalaureate _____ Class (e.g., 1st yr. M.S.) _____

Major _____

Expected date of graduation _____

If presently attending, list name and address of school: _____

Have you previously attended Duke: No _____ Yes _____ (Give dates): _____

Have you received a degree from Duke: No _____ Yes _____ (Give dates): _____

ALL STUDENTS (Applying to courses numbered 100 or higher)

List courses currently in progress (which would not yet appear on a transcript):

List other colleges and/or universities attended and degree(s) received: _____

EACH APPLICANT IS REQUIRED TO COMPLETE AND SUBMIT THIS APPLICATION BLANK AND TRANSCRIPT(S) (transcript required of students applying to courses numbered 100 or higher) OF ACADEMIC WORK COMPLETED TO DATE TO THE ADMISSIONS OFFICE. NOTE: A maximum of one 6 graduate unit or 1½ course program (6 semester hours) will be permitted per term (unless appropriate approval is obtained); FIRST AND SECOND CHOICES SHOULD BE INDICATED. LIST COURSE(S) DESIRED BELOW:

FIRST TERM:

Course Number	Course Title
1. _____	_____
2. _____	_____

(DUKE STUDENTS ONLY) Approval of assigned adviser; after April 29, Dean's approval required.

Adviser's/Dean's Signature _____ Date _____

SECOND TERM:

Course Number	Course Title
1. _____	_____
2. _____	_____

(DUKE STUDENTS ONLY) Approval of assigned adviser; after April 29, Dean's approval required.

Adviser's/Dean's Signature _____ Date _____

THIRD TERM:

Course Number	Course Title
1. _____	_____
2. _____	_____

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Adviser's/Dean's Signature _____ Date _____

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Undergraduate: Trinity _____ Engineering _____ Other (please specify) _____

Graduate: Grad. Sch. Arts & Sci. _____ Sch. Forestry & Env. Studies _____

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Expected date of graduation _____

Major _____

NONDUKE STUDENT (Attending Summer Session only)

Unclassified: Prebaccalaureate _____ Class (e.g., junior) _____

Postbaccalaureate _____ Class (e.g., 1st yr. M.S.) _____

Major _____

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Course Number

Course Title

1. _____

2. _____

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Adviser's/Dean's Signature _____ Date _____

THIRD TERM:

Course Number

Course Title

1. _____

2. _____

(DUKE STUDENTS ONLY) Approval of assigned adviser; after April 29, Dean's approval required.

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Suggestions for better advertising: _____

Duke University Marine Laboratory

Pivers Island
Beaufort, North Carolina 28516

MILEAGES FROM DUML TO:

- New Bern Airport - 37.5
- Jacksonville Airport - 60
- Kinston Airport - 80
- Wilmington Airport - 85
- Raleigh/Durham Airport - 160
- Durham - 180
- *stoplight at Atlantic Beach bridge - 3

MOTELS/POINTS OF INTEREST:

- 1-Fort Macon
- 2-Oceana
- 3-Landmark Inn
- 4-Sea Hawk
- 5-Holiday Inn
- 6-Atlantis
- 7-John Vancey
- 8-Whaler
- 9-Iron Steamer
- 10-Ramada Inn
- 11-Islander
- 12-NC Marine Resources Center

Havelock

NC 101

US 70

Morehead City

NC 24

to Jacksonville

Newport River

Bogue Sound

Beaufort

Atlantic Beach

11 10 9 8 7 6 5 4

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3

US 70

Harkers Island



to Ocracoke

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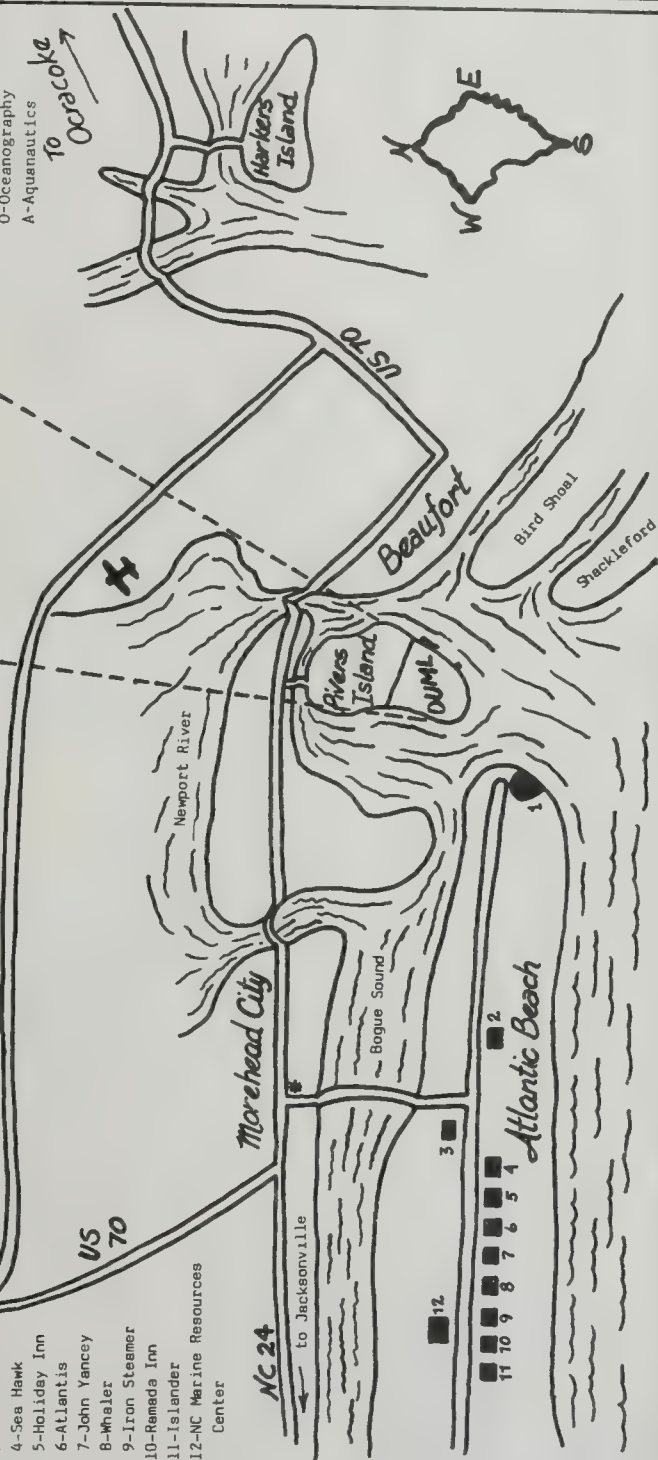
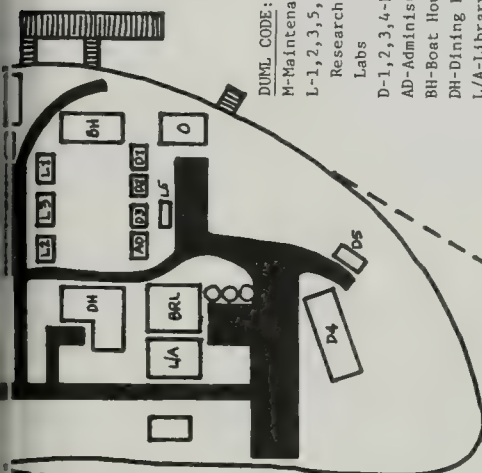
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- L-1, 2, 3, 5, BRL-
- Research/Teaching Labs
- D-1, 2, 3, 4-Dorms
- AD-Administration
- BH-Boat House
- DH-Dining Hall
- L/A-Library/Auditorium
- O-Oceanography
- A-Aquanautics

Raleigh/Durham

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New Bern

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(USPS 073-680)

Durham, NC 27706

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Duke University 1985-86

Graduate School



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Duke University 1985-86

Graduate School

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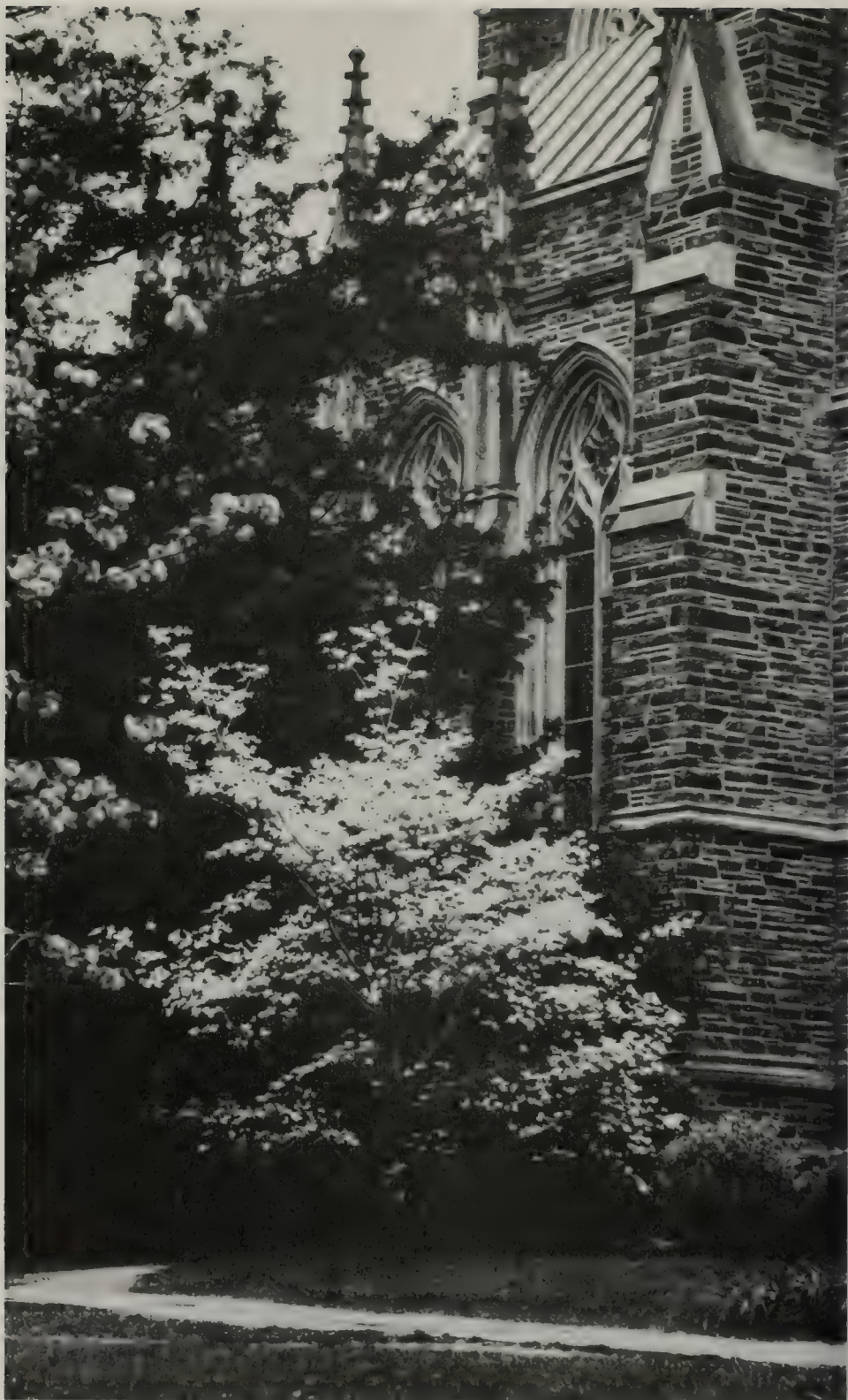
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The information in the bulletin applies to the academic year 1985-86 and is accurate and current, to the best of our knowledge, as of April, 1985. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, contact Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111.

The *Bulletin of Duke University*, Volume 57, includes the following titles. *The Fuqua School of Business*, *The School of Forestry and Environmental Studies*, *Marine Laboratory*, *Undergraduate Instruction*, *The Graduate School*, *The Medical Center*, *The Divinity School*, *Information for Prospective Students*, *The Graduate School (short form)*, *Allied Health Programs*, *The School of Law*, and *Information and Regulations*.

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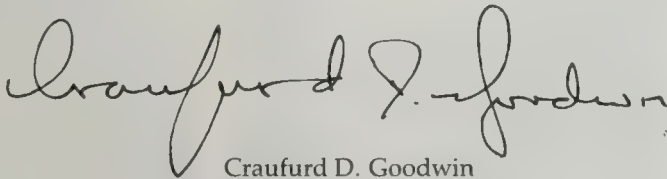


To the Prospective Graduate Student

From its beginning Duke University has maintained a first-rate Graduate School. This, we believe, is where excellence is established and where the two essential functions of a university, teaching and research, truly come together. Over the years Duke's strength at the graduate level has grown in all the main fields of knowledge. The faculty enjoys international distinction. The laboratories, libraries, and computer facilities are among the very best. Yet the Graduate School remains small enough so that personal contact is a central feature of our programs, and fruitful interaction across disciplines is a common experience.

We are confident that for the student in search of a fine graduate education Duke University has much to offer. This is a community in which minds and ideas grow. We provide training for many careers, but we seek also to stimulate personal creativity and to provide congenial surroundings in which education and research are both productive and pleasant.

We hope that the following pages will provide you with the information you require in making the important choice of the course of your graduate education, and we look forward to welcoming you to the Duke community.

A handwritten signature in black ink, reading "Craufurd D. Goodwin". The signature is fluid and cursive, with the first name "Craufurd" being more prominent and the last name "Goodwin" following in a similar style.

Craufurd D. Goodwin
Dean of the Graduate School

University Administration

General Administration

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Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
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Graduate School Administration

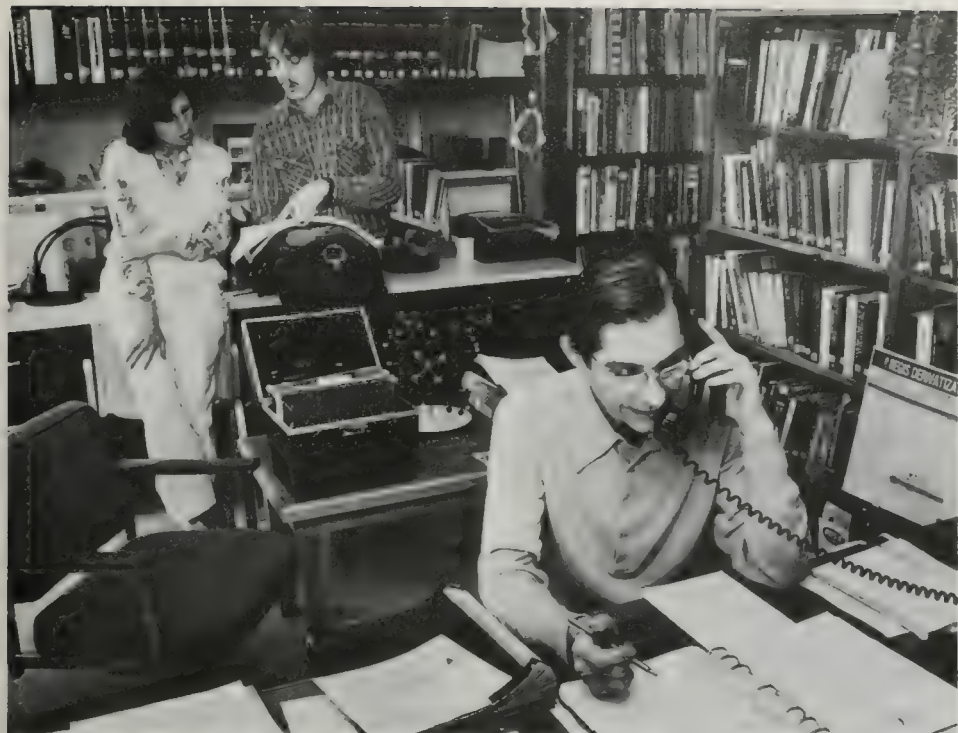
Craufurd D. Goodwin, Ph.D., *Dean of the Graduate School*
A. Leigh DeNeef, Ph.D., *Associate Dean*
Bonnie Erickson, Ph.D., *Assistant Dean*
Donna Lee Giles, A.B., *Assistant Dean*
Ellen Stern McCrate, M.A., *Assistant Dean*
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Executive Committee of the Graduate Faculty

Dean Craufurd D. Goodwin

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*Term expires August 31, 1985.





Introduction

A Community of Scholars

Writing in the 1920s the philosopher and man of science, Alfred North Whitehead, defined the purpose of a university in these terms: "The justification of a university is that it preserves the connection between knowledge and the zest for life by uniting the young and the old in the imaginative consideration of learning." If this is true of a university generally, it is true of a graduate school especially. Faculty members and graduate students work together in the imaginative recasting of ideas necessary for successful research and the development of human knowledge.

Ideally, a graduate school is a community of scholars engaged in imparting and extending the realm of human knowledge in the arts and sciences. A select group of students is admitted each year to undergo the rigorous discipline of an advanced degree program, the successful among them to emerge as scholars of promise. To enter into graduate education today is to accept a real challenge, and this decision should not be made casually. The work toward a doctorate requires several years of tireless effort and possibly sacrifice, and the material rewards may be less certain than in some alternative endeavor. However, pursued with determination, graduate education can be the doorway to a stimulating, creative, and meaningful life. The student who is contemplating this challenge may have many questions in mind; the mate-

rial that follows is an attempt to answer some of them.

The Decision to Go to Graduate School

The decision to work toward an advanced degree must be a personal commitment born of a willingness to devote oneself to many months or possibly years of academic discipline just at an age when one may be impatient for financial independence and freedom from academic discipline. Graduate study requires all of one's energy and enthusiasm; to enter into it half-heartedly is to invite discouragement or failure.

Qualities instrumental for success in graduate study are a natural curiosity and the capacity for self-discipline. A good undergraduate record may or may not be adequate evidence of these characteristics. Many students with excellent undergraduate records have been unsuccessful in graduate study because their undergraduate training stressed the marshalling and articulation of facts rather than real understanding and analysis of material. On the other hand, many distinguished scholars had undistinguished undergraduate records. In gaining admission to a graduate school, the undergraduate record is, of course, an important element, but usually some margin is left to allow for students who develop serious academic interests late in their undergraduate careers. Students are often best

able to judge for themselves whether their grades truly gauge their abilities.

There is no unerring way of knowing in advance whether one will be successful or happy in graduate school. It is quite likely, however, that if one has both motivation and ability and does not try it, there will be regrets in later years. Although the decision must be an individual choice, superior intellectual ability is a scarce human resource, and the encouragement and utilization of it is a matter of community as well as personal concern.

Choosing a Graduate School

Over 250 universities today offer work leading to the Ph.D. degree. Among these are about 60 institutions which grant only two or three such degrees a year in all fields combined. At the other end of the scale are about 50 universities which account for nearly 70 percent of all doctorates granted in this country. Duke University is among the latter, as are most of the major institutions which offer programs in a wide range of academic disciplines. But even if one can narrow the field to about 50 major institutions, how does one select among these, and what factors should affect one's final choice? A few key factors are discussed briefly below.

Size. Size is not an infallible guide to the quality of a graduate school. There are a number of poor graduate schools of exceedingly large size and a number of extremely good small ones. However, the ideal is a small number of superior students working closely in intellectual pursuits with a few esteemed scholars. It might be helpful simply to mention a few of the disadvantages of too many or too few students.

In an extremely large graduate school—there are some that have between 6,000 and 12,000 enrolled—classes of 50 to 100 students, inaccessibility of senior faculty, shortage of library materials and facilities, and only a nodding acquaintance with fellow students are a few of the possible drawbacks. An able student may develop well even in this at-

mosphere of mass production, but it is hardly the ideal.

An extremely small graduate school also has its disadvantages. Facilities are often limited, and the faculty is likely to be composed primarily of undergraduate instructors. A university must be willing to commit a significant portion of its resources to develop a graduate program of high quality, and this is often not the case in an extremely small graduate school.

More important than the size of the entire graduate school is the size of the particular departmental program in which a student is interested. An optimum doctoral program will have an enrollment of perhaps 30 to 100 students, admitting 15 to 40 new students each year and awarding perhaps three to ten Ph.D. degrees a year. This information is usually available in university catalogs or government publications on higher education.

Duke University is committed to programs of moderate size in which the interests of the student are important. Total enrollment in the Graduate School is 1,624 students. Between 500 and 550 new students are admitted each year from approximately 3,100 applications. Only six departments have more than 80 students; twenty-four departments have enrollments that fall within the optimum range suggested in the preceding paragraph.

Quality. Not only do universities differ considerably in their reputation for quality, but there are marked differences among departments within any university. Many excellent universities have a few weak departments in which a student would fare less well than in an excellent department in a less esteemed institution. Therefore, the student should not be guided solely by the reputation of a university as a whole, but should inquire more specifically about the area of specialization.

Since judging the quality of a graduate program is necessarily subjective, no two people are likely to be in complete agreement. Prospective students would do well to talk with their undergraduate professors, particularly those who have themselves achieved some reputation in

the world of scholarship. As witnessed by their own continuing writing and research, they are more likely to have reliable information on the merits of various graduate programs. Similarly, younger faculty members who are only four or five years out of graduate school may have more recent acquaintance with their own and other schools.

Another guide may be occasional questionnaires asking educators to rank various graduate departments.

Alone, none of these guides is adequate; however, in conjunction with individual advice and recommendations, they can serve as useful indicators. In summary, the best procedure is to take as many factors as possible into account, and then to apply to three or four of the schools high in consideration. (Applying to fifteen universities is a waste of the applicant's and the universities' time.) Write to the graduate school or to the departmental Director of Graduate Studies if further information is desired; visit the university in person, if possible; and carefully weigh the advice of distinguished faculty members of one's undergraduate college.

Duration of Program

The length of time a graduate student spends in study toward an advanced degree depends upon the requirements of the individual program, on personal work habits, and on the environment of the graduate school and the department in which the study is conducted.

The student's level of preparation before entering graduate school has a direct bearing on the speed with which the degree may be earned. A student who enters with proficiency in one or more foreign languages and a good foundation in the chosen field may well be able to finish within the minimum time limits. On the other hand, the student who is not as well prepared may find that one and a half to

two years are the minimum for the A.M. degree, and four to five years for the Ph.D. degree (although wise use of the summers may reduce this time somewhat). The total time may also be lengthened if the student must work during part of the period of residence.

The attitude of the graduate school and its various departments will also affect the time needed to complete the degree. During the last decade the average time elapsing between entering graduate school and receiving the doctorate in American universities has been about ten years. At Duke the average doctorate in the humanities requires a little over seven years, nearly six years in the social sciences, and slightly over four years in the sciences. Over the last few years, Duke University has been among the forerunners in reducing even further the time needed to obtain the Ph.D. without any sacrifice in quality. This effort has taken the form of trying to eliminate the unnecessary delays, particularly those due to financial burdens on the student. Duke ranks among the leading institutions in the country today in terms of financial aid per student from university sources. Moreover, much of this aid is in the form of fellowships and scholarships which do not require burdensome services in return. The large public institutions are often more restricted to awards which require substantial teaching, research, or other duties, thus reducing the speed with which a student can complete the resident course work. A student will be wise to inquire to what extent progress toward a degree may be delayed by the work entailed in certain awards. If, for example, an assistantship lengthens unduly the time necessary to obtain a degree, a smaller fellowship may be preferable. The duration of the graduate program depends on several factors, but the policy of the Duke Graduate School is to keep the length of time a student is involved in obtaining an advanced degree at a minimum.



Duke University Graduate School

Teaching and Research

In surveying the progress made in the first seven years after the founding of Duke University, its first President, William Preston Few, wrote that he wanted "to see the Graduate School made strong because it will best and most quickly ensure our attaining and maintaining a place of real leadership in the educational world." President Few believed that "more than anything else here our Graduate School will determine the sort of University we are to build and its standing in the educational world." This conviction has continued to prevail to the present day, with emphasis upon the interdependence of teaching and research as the necessary components of scholarship.

Over 700 members of the graduate faculty teach the approximately 900 courses and seminars offered in the Graduate School and supervise thesis and dissertation research. Many of the major universities of the world have helped to train this faculty; approximately 90 percent of the graduate staff hold degrees from the 52 institutions which make up the Association of Graduate Schools within the Association of American Universities. By place of birth, the faculty represent almost every state in the nation and almost two dozen foreign countries.

The groundwork for learning may be laid in privacy—indeed a certain amount of private study and research is absolutely essential—but the vital stimulus to

the learning process comes from one's contact with the minds of other people with similar or related interests. This is precisely why graduate schools are highly selective in their admissions policies, and it is one of the important reasons for their willingness to offer attractive fellowship awards to outstanding students. The superior student is a valuable catalyst both for fellow students and for faculty and is prized as such.

Faculty and students comprise the essential human factor in education, but their joint endeavor cannot prosper without adequate research and library facilities. Duke University has research facilities for physics, botany, zoology, chemistry, psychology, sociology, engineering, and biochemistry, as well as well-equipped laboratories in the various departments of medical science. They have been built entirely, or modernized and expanded, within recent years. The University has an excellent Computation Center on the campus and shares a computing facility with the University of North Carolina and North Carolina State University. The Triangle Universities Computation Center is among the largest research-oriented computer facilities in the world. The University has an excellent research library. In number of volumes, serials, and documents, and in breadth of coverage, the library offers more resources than many graduate schools with enrollments two or three times Duke's size. To the student in

the arts, humanities, or social sciences, this is an immeasurable asset.

Among the many special features of the Graduate School a few important examples may be mentioned. For students in the biological and physical sciences, the facilities of the Duke Marine Laboratory at Beaufort, North Carolina, are available for course work and research. The laboratory has research buildings, classrooms, research vessels, and living quarters which make it an excellent research center in marine biology. Closer to home are the 8,300 acres of Duke Forest, managed by the School of Forestry and Environmental Studies, ideal for research on timber growth, soils, and related topics. A regional nuclear structure laboratory is housed on the campus and serves the major universities in the area. The phytotron, adjacent to the botany greenhouses, is an integrated series of plant-growth rooms, chambers, and greenhouses, with forty-six separately controlled environments providing more than 4,000 square feet of plant-growing space. The environmental factors controlled in the units for the study of plant growth include light, temperature, nutrients, carbon dioxide concentration, and humidity.

Additional resources and facilities are available to the graduate student through Duke's fine Schools of Law, Business, Medicine, Engineering, Forestry and Environmental Studies, and the Divinity School. A two-term summer session and the availability of courses at the nearby University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University in Raleigh, under a cooperative arrangement, offer other opportunities to the graduate student.

No description of programs can begin to give the prospective student the full flavor of graduate study in a particular institution. If practical, a visit to the universities in which one is interested is always helpful. The Duke Graduate School offers a warm invitation to prospective students to come to the campus during the year to discuss their possible application and admission.

The visitor will find at Duke most of the facilities that one could hope for in the largest of institutions, and yet the University has been fortunate in avoiding many of the evils that seem inevitable with mass education. Despite a total University enrollment of approximately 9,500, Duke has retained the sense of community that one usually associates with a small liberal arts college. And in an age when current architectural whim often adds yet another stylistic variant to an already eclectic array of buildings, Duke has built a campus of unusual and architecturally coherent beauty. This, too, is an important part of education, creating an environment conducive to learning.

Special Programs

Center for the Study of Aging and Human Development. The primary aims of the center are to encourage and support basic and applied research on biomedical, behavioral, and social scientific aspects of adult development and aging; to train investigators for such research; to provide clinical training in geriatrics for health professionals; and to develop sources of scientific information which are accessible to interested individuals, organizations, and governmental agencies. Although the center does not offer degrees, the varied programs, research laboratories, and clinical settings provide a context and resource for undergraduate and graduate students and for health professionals with special interests in adult development and aging. Inquiries should be addressed to the Director, Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, North Carolina 27710.

Asian-Pacific Studies Institute. The purpose of the Asian-Pacific Studies Institute is to encourage and support advanced training in Asian-Pacific studies and in Chinese, Japanese, and eventually other Asian-Pacific languages. The institute sponsors an agenda of visiting speakers and scholars and coordinates study abroad programs in China and Japan. A limited number of fellowships are

granted which provide stipends for a two-year period. Fellows will be expected to reach the equivalent of third-year level of proficiency of language training during the term of their award. Incoming graduate students with the Ph.D. as their objective, students in good standing in the first year of study in Duke professional schools, and current Duke students enrolled in Ph.D. programs may be considered for these fellowships. Further information may be obtained from the Director, Asian-Pacific Studies Institute, 2111 Campus Drive, Duke University, Durham, North Carolina 27706.

Canadian Studies Program. The purpose of this program is to increase American knowledge and understanding of Canada by formalizing and expanding graduate interest in Canada, introducing the study of Canadian life and culture at the undergraduate level, and encouraging such study in primary and secondary schools. The program awards a limited number of graduate fellowships and teaching assistantships for the study of Canada by American residents at Duke who are working in their departments on a Canadian topic for their dissertations; sponsors lectures by Canadian specialists; and supports seminars devoted to Canada, held off and on campus. Inquiries should be addressed to the Director, Canadian Studies Center, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.

The University Program in Cell and Molecular Biology. This program centralizes the cell, developmental, and molecular biology research training found in eight of the University's departments: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. Prospective students may either apply to one of the participating departments, or apply directly to the program and designate a departmental preference. Applications for admission and fellowship support must be received by February 1, but early applications may receive advanced consideration. Inquiries should be addressed to Dr. Bernard Kaufman, The

University Program in Cell and Molecular Biology, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Continuing Education. Local adult residents may pursue graduate academic study at Duke as nondegree students through the Office of Continuing Education, which will provide both academic and career counseling to such students. Information and applications may be obtained from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

Cooperative Programs with Neighboring Universities: Library Exchange. Through a cooperative lending program, graduate students of the University of North Carolina and Duke University are granted library loan privileges in both universities.

Cooperative Program in Russian and East European Studies. The graduate schools of Duke University and the University of North Carolina offer a cooperative program leading to the A.M. and Ph.D. degrees in several disciplines (economics, history, literature, linguistics, political science, and sociology), with a concentration in Russian and East European studies. Students admitted to one institution are encouraged to enroll in courses advantageous to their programs at the other institution, to utilize the libraries and facilities of both universities, and to participate in the periodic colloquia involving the personnel of the two institutions and distinguished visiting scholars. For information, contact Dr. Vladimir G. Trembl, Department of Economics, Duke University, Durham, North Carolina 27706.

Center for Demographic Studies. The facilities of the center, located at 2117 Campus Drive, include a population library, the Joseph J. Spengler Collection of publications and research materials, and extensive data resources. These are available to the entire Duke community. The center does not offer degrees; it promotes the pursuit of advanced degrees, with a specialization in population studies,

through either the Department of Sociology or the Department of Economics. The center's program provides opportunities for direct student participation in ongoing research projects. The program of extramural research stresses, but is not limited to, applied work in the demography of aging, health, mortality, fertility, and migration. Inquiries for training opportunities may be directed to Dr. George C. Myers, Director, Center for Demographic Studies, Box 4732 Duke Station, Durham, North Carolina 27706.

Center for Environmental Engineering. The purposes of the Center for Environmental Engineering are to focus attention on pressing environmental problems, to provide orientation and educational opportunities in technical environmental subjects for both students and faculty, and to promote interdisciplinary environmental engineering research. The center sponsors a visiting speaker program and graduate and faculty seminars, and coordinates graduate and undergraduate courses in environmental engineering. Further information may be obtained by writing or visiting the Center for Environmental Engineering Office, 117D School of Engineering, Duke University, Durham, North Carolina 27706.

The University Program in Genetics. This is an interdisciplinary program with a faculty drawn from several of the biological science departments (anatomy, biochemistry, botany, microbiology and immunology, zoology), and is designed to meet the needs of students with a variety of educational backgrounds and professional objectives who are interested in specializing in the field of genetics. Interested students should apply for admission to the department of their choice, and after being admitted make arrangements to participate in the program. For information, consult Dr. J. Antonovics, Director, The University Program in Genetics, 132 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Master of Arts Program in Humanities. This interdepartmental program centered in the humanities and leading to

the A.M. degree is designed for students whose interests cross disciplinary lines and are not easily met by departmental programs. Students select a set of thematically related courses from the graduate level offerings of humanities departments, and, where appropriate, from other departments as well. The interdepartmental committee which manages the program offers aid in tailoring a set of courses to the individual student's needs, approves the program chosen, and provides ongoing supervision. Information on program requirements and admission may be found in the chapter "Advanced Degree Programs." Additional information may be obtained by writing the Director of Graduate Studies, Master of Arts Program in Humanities, The Graduate School, 127 Allen Building, Duke University, Durham, North Carolina 27706.

Indian Ocean Studies Program. The purpose of this program is to encourage both scholarly research and graduate training in the political, historical, economic, and sociocultural development of the countries of the Indian Ocean region. The Departments of History, Anthropology, Political Science, Religion, Music, Sociology, and Civil and Environmental Engineering, among others, actively cooperate with the program. Graduate students, in addition to meeting the requirements of the departments in which they are enrolled, are expected to take Hindi, Persian, Swahili, Arabic, or another Indian Ocean language appropriate to their research. Generally, field research which involves residence in an Indian Ocean country is expected for completion of the dissertation. The program sponsors a regular agenda of visiting speakers and scholarly presentations in its faculty/graduate student seminar, in addition to special research symposia and conferences. Inquiries should be addressed to the Chairman, Indian Ocean Studies Program, Center for International Studies, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.

Duke University International House. International House is the center

of cocurricular programs for the more than three hundred students from seventy-two countries, as well as for American students who are interested in other cultures or are considering travel or study outside the United States. The International Association, which includes a significant number of American members, plans social and cultural programs which emphasize personal contact and the informal exchange of ideas among students from diverse backgrounds. Included are weekly open-houses with lectures, films, pot-luck dinners, or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area. Programs which assist students from abroad in participating in the life of the Durham and Duke communities include an intensive orientation program at the beginning of the academic year; the Host Family Program, in which interested international students may become acquainted with American families; the International Wives Club, which provides a structure for international women to meet with American women in an informal atmosphere; and the Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community. Additional information may be obtained by writing to Dr. Brian Q. Silver, Director, International House, 2022 Campus Drive, Duke University, Durham, North Carolina 27706.

Islamic and Arabian Development Studies. This program, begun in 1977 with the assistance of grants from the government of Saudi Arabia and some twenty corporations in the United States, sponsors conferences and research on Islamic themes with special reference to developmental problems of the Arabian peninsula. The program provides a limited number of graduate fellowships as well as supporting courses and seminars on the language, literature, and contemporary problems of the Islamic world. It sponsors a student delegation to the annual Model Assembly of the League of Arab States in Washington, D.C. The 1984 delegation won the highest number of

awards given to any participating university. Twelve faculty members from outreach colleges were awarded fellowships for study in Cairo and six Duke faculty were given fellowships for study in Jordan in 1984. The program was the recipient of a bequest by the late Joseph J. Malone of his library in Arabian affairs. Other grants make possible the renovation of a room to house what will be known as the Malone Collection. The program also sponsors an outreach program which includes Appalachian State University, Belmont Abbey College, the College of Charleston, Converse College, Davidson College, Johnson C. Smith University, Old Dominion University, and the University of the South. Inquiries should be addressed to Dr. Ralph Braibanti, Director, Islamic and Arabian Development Studies, 2114 Campus Drive, Duke University, Durham, North Carolina 27706.

Latin American Studies Program. The Graduate School offers an interdepartmental program in Latin American studies in conjunction with several departments. Students apply to the Departments of Anthropology, History, Economics, Political Science, Sociology or Romance Languages, fulfilling the requirements of those departments and writing their A.M. and Ph.D. degrees under their auspices. In consultation with the candidate, a faculty committee will determine a special program of study giving the candidate rigorous training in the Latin American field in addition to their disciplinary training. The holdings of the Perkins Library for graduate work and research in Latin-American history, inter-American relations, economic history, politics, art, and Spanish-American literature are constantly being enlarged. Program faculty are involved in different national research programs dealing with Latin American topics and offer advice on fellowship support for graduate research in Latin America and the Caribbean. Inquiries should be directed to Dr. Arturo A. Valenzuela, Chairman, Council on Latin American Studies, Center for International Studies, 2101 Campus Drive,

Duke University, Durham, North Carolina 27706.

Master of Arts in Liberal Studies.

The Master of Arts in Liberal Studies is an interdisciplinary program that allows individuals with a variety of professional and personal educational interests the flexibility to pursue those interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students will study primarily on a part-time basis and will choose from an array of interdisciplinary courses developed specifically for this program. In addition, the students will select other graduate-level courses that fit their individual needs and interests. For further information, call or write Dr. Bonnie Erickson, Director, Master of Arts in Liberal Studies Program, Room 122 Allen Building, Duke University, Durham, North Carolina 27706, (919) 684-3222.

The Ph.D. Program in Literature.

This program offers to qualified students the possibility of gaining unusually broad credentials with which to embark on a teaching career in established national literatures as well as programs linking literature to other fields. Study in depth through courses in a single national literature is combined with a series of four core courses, given in a two-year sequence, on the fundamental issues of literary theory, history, and criticism. All the literature departments cooperate in this program and its students have access to all courses given under the auspices of the graduate faculties in the humanities. A full descriptive brochure is available. To obtain the brochure or other information, contact Dr. James Rolleston, Chairman, Committee for the Ph.D. in Literature, Department of Germanic Languages and Literature, 104 Language Building, Duke University, Durham, North Carolina 27706.

Medical Historian Training Program. Conducted under the auspices of the School of Medicine and the Graduate School, this program requires a minimum of six years of graduate study for

the M.D.-Ph.D., and four or five years for the M.D.-A.M. The M.D.-Ph.D. program is intended for those students who know that their major career effort will be in teaching and other scholarly activities in the history of medicine (not necessarily to the total exclusion of clinical medicine). The M.D.-A.M., on the other hand, is appropriate for those who are undecided, but who wish to acquire a firm foundation for future study, or for those who are seriously interested in pursuing an avocation in the history of medicine. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Inquiries should be addressed to Dr. Peter English, Director, Medical Historian Training Program, Box 3420, Duke University Medical Center, Durham, North Carolina 27710.

Medical Scientist Training Program. This program is conducted under the auspices of the Graduate School and the School of Medicine and is designed for students with a strong background in science who are motivated toward a career in the medical sciences and academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the clinical curriculum of the School of Medicine, and usually requires six to seven years of study leading to both the M.D. and Ph.D. degrees. Interested students should apply for admission to both the Graduate School and the School of Medicine. Additional information may be obtained by consulting Dr. Henry Kamin, Associate Director, Medical Scientist Training Program, Department of Biochemistry, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Program in Medieval and Renaissance Studies. This program is administered by the Duke University Center for Medieval and Renaissance Studies. A participating student is enrolled in one of the regular departments and fulfills the Ph.D. requirements for that discipline while taking a program of electives which will advance his or her interdisciplinary competence in the medieval or Renais-

sance areas. Such a program may include a choice from the fields of art history, language and literature, history, philosophy, and religion. Participation in the program will fulfill the Graduate School requirement for work in a related field. Inquiries should be addressed to the Director of Graduate Studies, Duke University Center for Medieval and Renaissance Studies, Box 4666, Duke Station, Durham, North Carolina 27706.

The University Program in Neurobiology. This interdisciplinary program was developed in response to recent advances in neurobiology which have resulted in closer ties among the various approaches to studying the nervous system. The program is designed for students who wish to study the nervous system at several levels ranging from the molecular to the behavioral, and students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Each student must affiliate with one of the participating departments— anatomy, biochemistry, microbiology and immunology, pathology, pharmacology, physiology, psychology, and zoology—and must meet the requirements of that department for the Ph.D. degree. Prospective students should apply directly to one of the eight participating departments, and should indicate on the application their interest in the University Program in Neurobiology. Inquiries should be directed to Dr. Irving T. Diamond, Director, University Program in Neurobiology, Department of Psychology, Duke University, Durham, North Carolina 27706.

Oak Ridge Associated Universities. Duke University is one of the sponsoring universities of the Oak Ridge Associated Universities located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all of the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge. Fellowships in several fields of science

are available to qualified applicants. Further information may be obtained from Dr. Harold W. Lewis, Department of Physics, Duke University, Durham, North Carolina 27706.

Institute of Policy Sciences and Public Affairs. See Public Policy Studies in the chapter "Advanced Degree Programs" in this bulletin.

Center for Resource and Environmental Policy Research. Housed in the School of Forestry and Environmental Studies, the center combines the efforts of a small permanent faculty with participation by business leaders, government officials, and the faculty and students of Duke University and other universities to provide a center of excellence for the analysis of contemporary resource and environmental policy issues, a forum for the examination of public and private responsibilities for natural resources and the environment, and a link between the specialized knowledge of academia and the information needs of government and industry. Graduate research assistantships are offered to qualified students researching resource and environmental policy problems. Support is available to students pursuing M.S., A.M., or Ph.D. degrees through the Graduate School at Duke University and in conjunction with the School of Forestry and Environmental Studies or other departments. Course work is offered in both intensive (one to three weeks) and semester-long formats. For further information, write to Dr. William Hyde, Center for Resource and Environmental Policy Research, 102 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

The University Program in Toxicology. This interdepartmental program provides graduate students and postdoctoral fellows an opportunity for a strong education in toxicology through support of courses, seminars, and research. The objectives of program members are to understand and devise controls for those toxicological phenomena having direct effects on human life and health, to train scholars who will advance the science of this discipline, and to provide a forum

for faculty and student discussion of recent research developments. The faculty of the toxicology program is drawn from anatomy, biochemistry, chemistry, forestry and environmental studies, microbiology and immunology, pathology, pharmacology, physiology, zoology, and several departments in the School of Medicine. Current areas of research include pulmonary toxicology, neurotoxicology, immunotoxicology, carcinogenesis, and biochemical toxicology. Students may base their training in general toxicology, ecotoxicology, or in any area in which the faculty is currently involved. Prospective graduate students may apply to the program directly or to one of the participating departments, and must be admitted to the department and to the program. Information on fellowship support and application procedures may be obtained from Dr. William S. Lynn, Director, University Program in Toxicology, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Organization for Tropical Studies.

Duke University is a member of an international consortium created to promote an understanding of tropical environments through research and research-training programs in the tropics. A basic eight-week OTS course in tropical biology is conducted twice a year, and advanced course offerings are scheduled periodically in agriculture, anthropology, botany, earth sciences, forestry, geography, marine biology, meteorology, and zoology. For information, consult Dr. Donald Stone or Dr. Richard White, Department of Botany; or Dr. John Lundberg, Department of Zoology; Duke University, Durham, North Carolina 27706.

Short Courses and Conferences.

Short courses, institutes, and training programs are conducted throughout the year by the Office of Continuing Education. Some are residential, others are designed for local participants; some carry academic credit, others award continuing education units (CEU); still others are noncredit. Previous programs have included Federal Regulations, Writers'

Conferences, Energy Conservation in Buildings, School Management, Product Safety, the Computer Camp, and the Summer Institute of Alcohol Studies. Contact Dr. Judith Ruderman, Director, Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708, for brochures describing current offerings and for assistance in developing programs.

Duke Summer Festival of Creative Arts. The Duke Summer Festival of Creative Arts is a part of the Summer Session and an extension of the function of the Office of Cultural Affairs, coordinating the arts in the summer and providing an exciting, artistically stimulating environment for the campus and community. Distinguished artists and scholars will be involved in cocurricular sessions. Students will have opportunities to try their wings in formal and informal productions. Information may be obtained by writing Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706.

Summer Drama Program. The Duke University Drama Program, which began its course offerings in the summer of 1974, strives to make its summer offerings particularly exciting and innovative. The undergraduate course offerings and the production program of Summer Theatre at Duke offer the theater-oriented student an integrated program of training in practical theater and dramatic literature during the first summer term. Detailed information on faculty, courses, productions, and auditions may be obtained by writing to Summer Drama Program, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

Summer Theatre at Duke. Founded in 1972, Summer Theatre at Duke has become an eagerly awaited series of theatrical events. The repertory is chosen from the best in modern theater and musical comedy with an occasional new look at a classic. The casts are selected on the basis of auditions held during late spring. Four professional guest artists will headline casts of student and local talent. Direction and design are provided by the

professional staff of the Duke University Drama Program. For further information, write to Summer Theatre, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

The American Dance Festival. The six-week program offers a wide variety of classes, performances, and workshops. For a catalog, write to the American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

General Regulations Governing Graduate Studies

The official, detailed *Bulletin of Duke University: Graduate School*, published in March of each year, gives an account of regulations concerning graduate work at Duke University and a full description of course content. The following pages are a summary of these materials for 1985-86 and should provide sufficient information for the prospective student. The bulletin is normally mailed to each student who is admitted to the Graduate School in the late spring of the year of matriculation so that the course program may be planned for the first year.

Admission

Admission to the Graduate School is required of all students who intend to pursue study toward a degree offered by the Graduate School. All applicants are considered without regard to race, color, religion, sex, age, handicap, or national origin.

A student seeking admission to the Graduate School of Duke University must have received the bachelor's degree (or the equivalent) from an accredited institution. The student's undergraduate program should be well-rounded and of high quality, indicating ability for graduate study. Ordinarily the student should have majored in the area of intended graduate study. Many departments (see the chapter "Advanced Degree Programs") list specific prerequisites. Satisfactory scores on the Graduate Record Examination are required by all departments.

A student who holds a bachelor's degree and who does not intend to earn an advanced degree at Duke University at the present time but who desires graduate work for professional or other reasons may consider three options: (1) admission as a regular nondegree student in the Graduate School, which involves application to a particular department and fulfillment of standard application procedures and requirements; (2) admission as a special nondegree student through the Office of Continuing Education in conjunction with the Graduate School, without departmental affiliation, following special application procedures; and (3) admission as an unclassified student in the summer session only, requiring application to the Director of the Summer Session.

Many graduate departments will consider applications from students wishing to pursue degree study on a full-time or part-time basis. Admission requirements, procedures, and deadlines are the same for both full- and part-time students. Part-time study requires a minimum registration of 3 units per semester, and while it is possible to obtain the master's degree on a totally part-time basis, the Ph.D. degree does require a minimum of one year of full-time residence. Additionally, students must maintain continuous registration from entry into the Graduate School to completion of degree. Time limits for completion of degrees are the same for both full- and part-time students. Financial aid through Duke University is not available to part-time students (except during their year of full-time residence). Visa restrictions do not allow nonimmigrant students to pursue graduate study on a part-time basis.

Procedures. A student seeking admission to the Graduate School should obtain an application packet from the Dean of the Graduate School. (Note: Persons interested in the Master of Arts in Liberal Studies should contact that program directly for information, requirements, and special application materials.) This packet contains all required forms and detailed application instructions. The application form must be filled out completely, signed,

and returned to the Office of Graduate Admissions accompanied by a nonrefundable fee of \$35 in U.S. currency (check or money order payable to Duke University). In addition, the student should provide the following supporting documents: (1) two copies of the official transcript from each post-secondary institution attended (college, university, or seminary) sent directly to the Graduate School by the institution; (2) two supplementary transcripts, sent as soon as possible, showing completion of work which was in progress when the earlier transcript was made; (3) three letters of recommendation from persons best qualified to judge the applicant as a prospective graduate student, written on the forms provided and returned by the applicant in the confidential envelopes that have been sealed-then-signed by the recommenders (or returned directly to the Graduate School by the recommender); (4) official scores on the Graduate Record Examination General (Aptitude) Test for applicants to all departments; and (5) official scores on the Graduate Record Examination Subject (Advanced) Test for applicants to programs in botany, English, literature, mathematics, music, physics, and zoology. It is recommended that the student take the GRE Subject Test if applying to anatomy, biochemistry, chemistry, electrical engineering, geology, mechanical engineering and materials science, microbiology and immunology, pathology, pharmacology, physiology, political science, psychology, or Romance languages.

Students applying for fall admission and award should take the Graduate Record Examination no later than the October testing in the previous year to meet our February 1 deadline. (The deadline is January 15 for the program in clinical psychology only.) Information on the times and places of the Graduate Record Examination can be provided by the applicant's college or by the Educational Testing Service, Box 955, Princeton, New Jersey 08541.

Fully qualified students from outside the United States are invited to apply for admission to full-time study in the

Graduate School. The foreign student must, in addition to the information required of all students, submit the following materials with the application: (1) if the student's native language is not English, certification of English proficiency demonstrated by official scores from the Test of English as a Foreign Language (TOEFL), administered through the Educational Testing Service, Box 899, Princeton, New Jersey 08541 (the Graduate School requires a score of 550 or higher on the TOEFL); (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per calendar year are between \$16,000 and \$17,000). Foreign students may apply for full-time study only.

During new matriculants' first registration period at Duke, every foreign student whose native language is not English will be required to take a test to verify competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack the necessary competence should be prepared to undertake additional English language instruction. Students who do not successfully pass the test for competence in oral and written English by the end of their first year of residency will not be permitted to continue graduate work at Duke University. Passing this examination will not meet degree requirements for a foreign language.

Applicants who are admitted will be offered full admission, provisional admission, or nondegree admission and will receive a letter of admission from the Dean of the Graduate School and an acceptance form. Admission to the Graduate School is offered only by the Dean. The process of admission is not complete until the student returns the acceptance form. An admission offer is only for the semester specified in the letter of admission, and admission may not be deferred automatically from one term to another. *Provisional admission* for a trial period of one semester or a minimum of 12 hours of course work is offered to students who appear to warrant admission but do not

comply fully with admission requirements. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission. *Nondegree admission* is offered to students who meet the admission requirements and who desire to engage in graduate study not subject to the restrictions of a graduate degree program. With the approval of the student's major department and the Dean of the Graduate School, a maximum credit of 12 units earned under nondegree status may be applied toward an advanced degree at Duke University if and when the student is granted full admission.

It is the applicant's responsibility to make certain that the Graduate School office has received all required material before the specified deadlines. Only

complete applications can be considered. To ensure that the Admissions Office will have adequate time to assemble all items submitted on an applicant's behalf, applications should be submitted at least two weeks before the closing dates listed in the calendar at the close of this chapter. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

We encourage all candidates to complete their applications by February 1 (for the program in clinical psychology, January 15). Anyone whose folder is not complete by that date will face the possibility that departmental enrollment will have been filled. Financial aid award decisions cannot be made for applications that are incomplete on that date until decisions have been made on all complete applications.





Earning the Degrees

Duke University offers graduate programs leading to the specified advanced degrees in the following fields: *

Anatomy, Ph.D.

Anthropology, Ph.D.

Art History, A.M.

Biochemistry, Ph.D.

Biomedical Engineering, M.S., Ph.D.

Botany, A.M., M.S., Ph.D.

Business Administration, Ph.D.

Chemistry, M.S., Ph.D.

Civil and Environmental Engineering,
M.S., Ph.D.

Classical Studies, Ph.D.

Computer Science, A.M., Ph.D.

Economics, A.M., Ph.D.

Electrical Engineering, M.S., Ph.D.

English, A.M., Ph.D.

Forestry and Environmental Studies,
A.M., M.S., Ph.D.

Geology, M.S., Ph.D.

Germanic Languages and Literature,
A.M.

Health Administration, M.H.A.

History, A.M., Ph.D.

Humanities, A.M.

Liberal Studies, A.M.

Literature, Ph.D.

Mathematics, A.M., M.S., Ph.D.

Mechanical Engineering and Materials
Science, M.S., Ph.D.

Microbiology and Immunology, Ph.D.

Musicology, A.M., Ph.D.

Pathology, M.S., Ph.D.

Pharmacology, Ph.D.

Philosophy, A.M., Ph.D.

Physical Therapy, M.S.

Physics, A.M., Ph.D.

Physiology, Ph.D.

Political Science, A.M., Ph.D.

Psychology, Ph.D.

Public Policy Studies, A.M.

Religion, A.M., Ph.D.

Romance Languages, A.M., Ph.D.

Sociology, A.M., Ph.D.

Zoology, Ph.D.

*Students interested in additional information on departmental programs not furnished in the *Bulletin of Duke University: Graduate School* should contact the Director of Graduate Studies in the appropriate department.

The Language Requirement

Although individual departments establish their own requirements (see individual departmental headnotes in the chapter "Advanced Degree Programs"), the regulations of the Graduate School require no foreign language for the master's degree, and a reading knowledge of one foreign language, ancient or modern, for the Ph.D. degree. The languages normally required are French, German, and Russian, but others may be offered if appropriate and approved.

The foreign language requirement may be satisfied in the following ways: (1) by a passing score on one of the Graduate School Foreign Language Test (GSFLT) examinations administered at any national center prior to entering Duke or at Duke University after matriculation and taken no longer than six years before the preliminary examination, (2) by transfer from another institution, with the limitations set forth in the more detailed *Bulletin of Duke University: Graduate School*, (3) in any language for which GSFLT tests are not available, by a reading examination administered by a qualified examiner and arranged by the Graduate School office, or (4) by a reading examination in any foreign language, administered by a qualified member of the faculty under a procedure specified by the department and approved by the Dean and the Executive Committee of the Graduate Faculty.

Advanced level, noncredit, reading courses in French and German are provided for students who need them.

Foreign students whose native language is not English may, with the approval of the Director of Graduate Studies in their major department, request permission of the Dean of the Graduate School to substitute English for a foreign language required in the master's or doctoral program.

Other Requirements

The general requirement for a master's degree is a minimum of 30 units (semester hours) of course-seminar-research credit. The student must present acceptable grades for a minimum of 24 units of

graduate courses. The nature of the additional 6 units for which students must register depends on whether they are enrolled in thesis or nonthesis programs; i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department.

A master's program can be completed in one academic year, but the student who presents a thesis usually needs at least a calendar year, and foreign students should be prepared to study for two years. The maximum length of time permitted from first registration to completion of all requirements is six years. Under certain circumstances a maximum credit of 6 units may be transferred toward the master's degree for graduate courses completed elsewhere, provided the grades earned in the particular courses were not less than *B* or the equivalent. In such a case, however, the transfer of graduate credit does not reduce the required minimum registration for a master's degree at Duke.

The course-seminar-research requirement in the doctoral program is 60 units, but the proportions of course-seminar work and research are generally flexible, based on individual needs. Those applicants with master's degrees, after establishing quality work here, may be granted transfer credit up to a maximum of 15 units. The dissertation is expected to be a mature and competent piece of writing, embodying the results of original and significant research. All dissertations will be published on microfilm and the author may retain copyright privileges.

Time limitations are set for the completion of the doctoral program. The preliminary examination, which may be taken only after language, course-seminar, and residence requirements have been met, formally admits a student to candidacy for the degree. This examination should be passed by the end of the third year of doctoral study. The interval between preliminary examination and presentation of an acceptable dissertation should ordinarily be one to two years and may not be more

than four years without special approval by the Dean. Should this interval extend beyond five years, a second preliminary examination usually becomes necessary.

Financial Information*

Tuition and fees are charged at the rate of \$263 per unit (a unit is equivalent to a semester hour), with the normal full program of study being 24 units for an academic year. The basic necessary expenses for a year of graduate study, assuming one lives in University graduate housing, are approximately as follows:

Registration Fee	\$200
Tuition	\$6,312
Health Fee	190
Room Rent† (Central Campus Apartments)	2,784
Meals‡	1,670

†Depending upon accommodations chosen.

‡Cafeteria estimate.

Normally, a doctoral student will not pay tuition beyond 60 units of degree credit.

Additional allowances should be made for books, laundry, and other personal expenditures.

Apartment accommodations for graduate and professional students are available in the Central Campus Apartments, the Town House Apartments, and modular homes, all of which are conveniently located close to East and West Campus. Two- and three-bedroom apartments are available furnished or unfurnished. In addition to University housing, the Central Campus office maintains an off-campus listing service which provides a list of privately owned homes, apartments, duplexes, and efficiencies for rent in Durham.

Duke University does not have a deferred payment plan for tuition, fees, and other charges. Students are expected to pay tuition and fees at the time of matriculation unless they plan to pay via payroll deduction from payments received for

fellowships, assistantships, or employment. Graduate students who receive payments from the University and who plan to pay tuition and fees and/or campus housing charges via payroll deduction must make arrangements in the Bursar's office for such deduction.

Financial Aid. In recent years at Duke about two-thirds of all full-time students have held an award of some type; about one-third of these were aided by Duke funds and the other two-thirds by funds from other sources. Part-time students are not eligible for financial aid from the University.

The student who seeks financial aid from Duke University should be certain that the request for admission and award is filed not later than February 1 of the year in which September admission is sought. (The deadline is January 15 for the program in clinical psychology.) The application for admission, including transcripts of previous college work and letters of recommendation, is processed by the Graduate School and forwarded to the department in which the student wishes to pursue advanced work. The graduate faculty—or admissions committee—in the department reviews all applications and then makes its recommendation to the Dean for announcement in late March. The most outstanding applicants are then offered awards; the next in order of rank are placed on an alternate list for awards. Other students are offered only admission to the Graduate School. Because of multiple applications by students, a fraction of the awards offered by any graduate school are not accepted. Alternates on the award list are immediately notified, and the process continues until the available number of awards has been made.

Awards to entering students at Duke are in the form of fellowships, scholarships, and assistantships. Students holding awards usually are paid in nine equal installments beginning in late September.

James B. Duke Graduate Fellowships are provided through the Duke Endowment. Fellows are chosen from

*The figures contained in this section are subject to change prior to the beginning of the fall, 1985, semester.

nominations made by the departments. Only outstanding applicants who are seeking the Ph.D. degree are considered. These nominations are made in late February and are judged in a competition which includes candidates from all departments granting the Ph.D. degree. The fellowships provide for payment of tuition for full registration and a stipend of \$916.67 per month for twelve months during the duration of the award. The award requires no service beyond that which is required of all students in a given department as a part of their training and is renewable each year upon satisfactory progress toward the degree at a fellowship level of quality. The total value of a James B. Duke Fellowship over the full three years of tenure is over \$50,000 at current tuition rates.

Graduate Fellowships range in value to \$15,000 for the calendar year and are made on a year-to-year basis. They are awarded upon recommendation by each department. No service is required as a prerequisite for accepting a fellowship, but all fellowship holders are expected to maintain full-time registration.

Special Graduate Fellowships for Minority Students provide for payment of tuition plus a stipend of up to \$800 per month for nine months. They are awarded to qualified applicants upon the recommendation of the department.

Graduate Scholarships provide for payment of tuition or partial tuition. Full tuition scholarships are valued at \$6,702 for the academic year. Scholarships are awarded upon the recommendation of each department.

Graduate Assistantships range in value to \$13,000 for the academic year. Assistants are normally permitted to reduce their registration to 9 units, and residence credit as a full-time student is allowed under these circumstances. Assistantships are most common in the science departments, where the student often provides laboratory assistance to various members of the faculty. Most graduate assistants remain in residence during the summer sessions carrying research or course credit. In this way, the

normal progress toward a degree is not impeded by the reduced load during the fall and spring semesters. Departmental research funds are often available to provide financial assistance during the summer.

Other graduate fellowships are available from foundations, industry, or the government. Among those at the University's disposal are: Kearns fellowships in religion, Mellon fellowships and traineeships under a grant from the Office of Education for students in the Canadian Studies Program, and Medieval and Renaissance Studies fellowships. Over 300 other traineeships and assistantships are available in the biological, physical, and social sciences under grants from the National Institutes of Health, National Institutes of Mental Health, National Science Foundation, research agencies in the Department of Defense, and other governmental agencies.

Loans. Students who anticipate the need to supplement their financial resources through loans should contact their state lending agencies or banks which provide loans through the Federally Insured Student Loan Program. Students should contact the Graduate School Financial Aid Office for information concerning obtaining the Guaranteed Student Loan if they have problems establishing residency or locating a lender in their home states.

It is the policy of the Graduate School to provide loans through the University to help students meet their educational expenses. Students with full-time status who meet the federal criteria for need and who have applied for loans from their state agencies are eligible for loans through the University. Loan funds are provided through the Federally Insured Student Loan Program and the National Direct Student Loan Program. Generally, loans made from these funds or the state lending agencies bear no interest charge to qualified borrowers while they maintain student status and for a short period thereafter. Interest during the repayment period is at a generally favorable rate. The amount of a loan through Duke for first

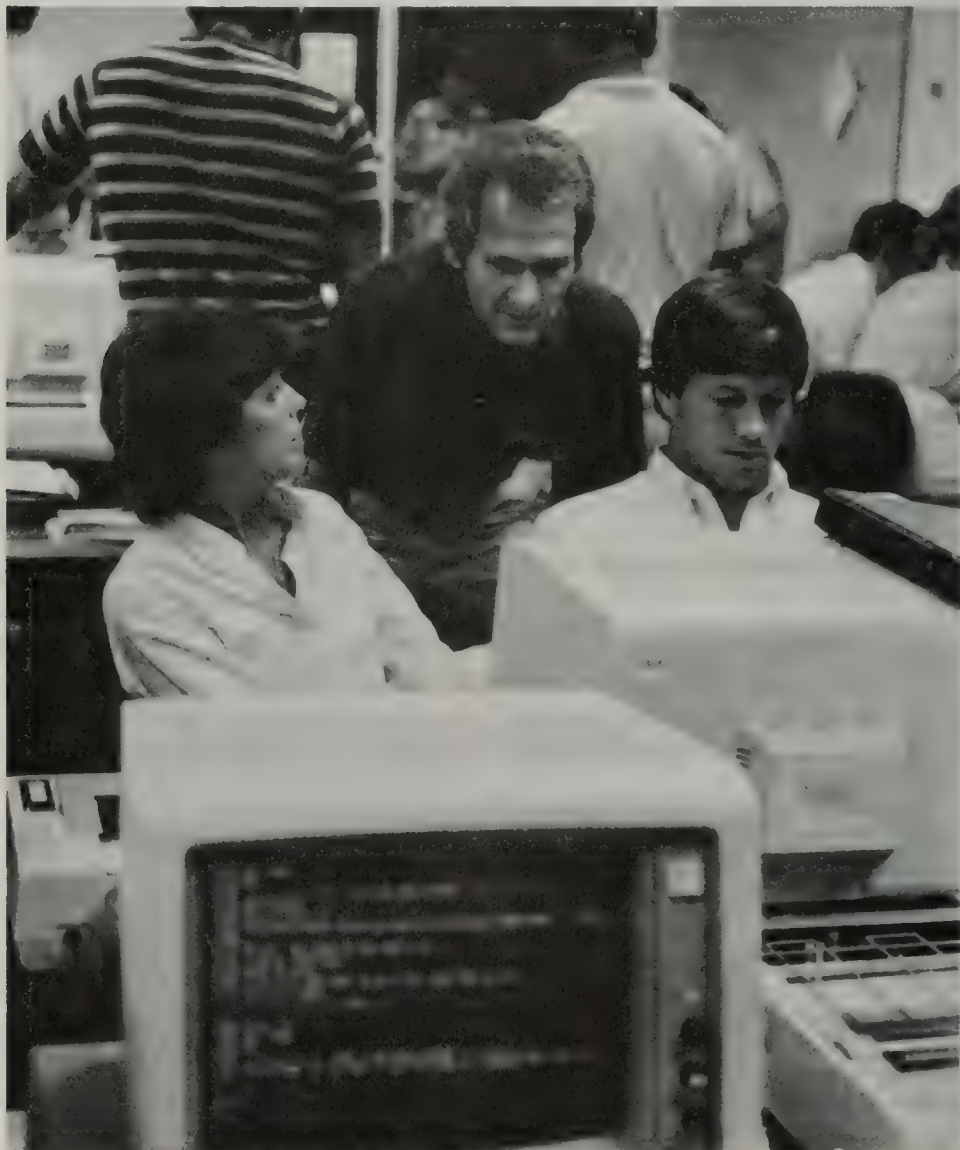
year graduate students is usually limited to the amount of tuition.

Inquiries concerning loans should indicate the department of intended matriculation and include all pertinent information concerning application to a state agency. These inquiries should be addressed to the Financial Aid Coordinator, Graduate School, Duke University, Durham, North Carolina 27706.

The costs of graduate education are high, but Duke University attempts to allocate its funds so that the superior stu-

dent is able to finish work for a degree in the normal length of time regardless of personal financial resources. This is a contribution to the community of scholarship which the University is glad to bear.

The applicant who wishes further information on facilities and regulations on course programs not covered in this bulletin is invited to write to the Dean of the Graduate School, or the Director of Graduate Studies in the department of intended study.



Calendar of the Graduate School

Summer Session 1985

First Term: May 9-June 22
Second Term: June 25-August 8

Academic Year 1985-86

First Semester: August 26-December 14
Second Semester: January 8-April 26

August 20-21	Registration for first semester
August 26	Classes begin
October 12-15	Fall break
November 23-December 1	Thanksgiving recess
December 3-9	Reading period*
December 14	End of first semester
January 7	Registration for second semester
January 8	Classes begin
February 29-March 9	Spring recess
April 15-21	Reading period*
April 26	End of second semester
May 3-4	Commencement

Special Deadlines for Admission Applications

July 15, 1985	Last day for completing application for admission to the fall 1985 semester
November 1, 1985	Last day for completing application for admission to the spring 1986 semester
January 15, 1986	Final deadline for application to program in <i>clinical psychology</i> , fall 1986
February 1, 1986	Last day for completing application for admission and award to the fall 1986 semester†
April 15, 1986	Last day for completing application for admission to the first 1986 summer session‡
May 15, 1986	Last day for completing application for admission to the second 1986 summer session‡
July 15, 1986	Last day for completing application for admission to the fall 1986 semester

*For 200-level courses, the length of the reading period is at the discretion of the instructor.
†Applications completed after this date may be considered for admission, if all spaces have not been filled, and for financial aid, if funds are still available.
‡Students seeking admission to the Graduate School for study in the summer session should apply to the Dean of the Graduate School and to the Director of the Summer Session.



Advanced Degree Programs

Anatomy

Professor J. David Robertson, M.D. (Harvard), Ph.D. (Massachusetts Inst. of Tech.), *James B. Duke Professor of Anatomy and Chairman*

Professor Sheila J. Counce, Ph.D. (Univ. of Edinburgh), *Director of Graduate Studies*

Professors

Matt Cartmill, Ph.D. (Chicago); Harold Erickson, Ph.D. (Johns Hopkins); William C. Hall, Ph.D. (Duke); William Hylander, Ph.D. (Chicago); Richard F. Kay, Ph.D. (Yale); Montrose J. Moses, Ph.D. (Columbia), *R. J. Reynolds Industries Professor in Medical Education in the Department of Anatomy*; R. Bruce Nicklas, Ph.D. (Columbia); Elwyn L. Simons, Ph.D. (Princeton), D.Phil. (University Coll., Oxford)

Associate Professors

Joseph M. Corless, M.D., Ph.D. (Duke); Eric L. Effmann, M.D. (Indiana Univ. School of Med.); William Longley, Ph.D. (London); Thomas J. McIntosh, Ph.D. (Carnegie-Mellon); Michael K. Reedy, M.D. (Washington); Lee Tyrey, Ph.D. (Illinois)

Assistant Professors

Nell Cant, Ph.D. (Michigan); Martin Joseph Costello III, Ph.D. (Duke); David Fitzpatrick, Ph.D. (Duke); William E. Garrett, M.D., Ph.D. (Duke); Emma Raff Jakoi, Ph.D. (Duke); Michael K. Lamvik, Ph.D. (Chicago); Chia-Sheng Lin, Ph.D. (Vanderbilt); Ross D. E. MacPhee, Ph.D. (Alberta); Patricia M. Saling, Ph.D. (Pennsylvania); Frederick H. Schachat, Ph.D. (Stanford); Kathleen P. Smith, Ph.D. (Harvard)

Professor Emeritus

John Wendell Everett, Ph.D. (Yale)

Associate Professor Emeritus

Kenneth Lindsay Duke, Ph.D. (Duke)

Assistant Medical Research Professors

Hie Ping Beall, Ph.D. (Tulane); David Aaron Kopf, Ph.D. (Chicago); Alan David Magid, Ph.D. (Washington); Darrell R. McCaslin, Ph.D. (Duke); Richard B. Marchase, Ph.D. (Johns Hopkins); Kenneth A. Taylor, Ph.D. (California at Berkeley)

Lecturer

Irving T. Diamond, Ph.D. (Chicago)

The Department of Anatomy offers graduate work leading to the Ph.D. degree. A common focus on the interrelations of biological structure and function characterizes the research of the anatomy faculty, although three general departmental subdi-

visions are recognized: biophysical, cellular, and molecular biology; neurobiology; and physical anthropology, functional morphology, and primate evolution.

The department offers doctoral training programs designed to produce teachers and research scientists competent in a broad range of the anatomical sciences, and students with a wide variety of backgrounds and interests in the biological sciences can be accommodated within the Ph.D. program. All students participate in the core anatomical science courses (Anatomy 305, 307, 309) and gain experience in teaching over the range of departmental interests. The anatomy department is also a participating member of several interdisciplinary training programs, such as those in genetics, cell and molecular biology, neurobiology, pharmacology, and biological systems. All students are encouraged to round out their training by drawing upon anatomy courses as well as those offered by other departments in the University. Laboratories within the department are equipped for and actively support research in several areas. For further information contact the Director of Graduate Studies.

Courses of Instruction

216S. Biological Psychology
217. Structure and Function of Visual Photoreceptors
219. Molecular and Cellular Bases of Differentiation
220. Developmental Biology
246S. The Primate Fossil Record
259. Molecular Biology I: Protein and Membrane Structure/Function
266. Comparative Neurobiology
269. Advanced Cell Biology
286. Electron Microscopy and Related Techniques
301. Anatomy of the Limbs
305. Gross Human Anatomy
307. Microscopic Anatomy
309. Neuroanatomy
310. Frontiers in Neurobiology

311. Concepts in Cell Biology
312. Research
313, 314. Anatomy Seminar
340. Tutorial in Advanced Anatomy
354. Research Techniques in Anatomy
370. Neurobiology I
418. Reproductive Biology
424. Seminar in Reproductive Biology

Courses Currently Unscheduled

219S. Seminar
238. Functional and Evolutionary Morphology of Primates
288S. The Cell in Development and Heredity
302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

Anthropology

Professor William M. O'Barr, Ph.D. (Northwestern), *Chairman*

Associate Professor Naomi R. Quinn, Ph.D. (Stanford), *Director of Graduate Studies*

Professors

Matt Cartmill, Ph.D. (Chicago); Richard G. Fox, Ph.D. (Michigan); Ernestine Friedl, Ph.D. (Columbia), *James B. Duke Professor of Anthropology*; Elwyn L. Simons, Ph.D. (Princeton), D.Phil. (University Coll., Oxford), *James B. Duke Professor of Anthropology*

Associate Professors

Mahadev L. Apte, Ph.D. (Wisconsin); Kenneth E. Glander, Ph.D. (Chicago); William Hylander, Ph.D. (Chicago); Carol A. Smith, Ph.D. (Stanford)

Assistant Professors

Virginia R. Domínguez, Ph.D. (Yale); Michel-Rolph Trouillot, Ph.D. (Johns Hopkins); Robert P. Weller, Ph.D. (Johns Hopkins); Brackette F. Williams, Ph.D. (Johns Hopkins); Allen Zagarell, Ph.D. (Freie Univ., West Berlin)

Professor Emeritus

Weston LaBarre, Ph.D. (Yale), *James B. Duke Professor Emeritus of Anthropology*

Adjunct Associate Professors

Richard F. Kay, Ph.D. (Yale); Carol Stack, Ph.D. (Illinois)

The department offers graduate work leading to the Ph.D. degree in anthropology. Applicants for admission should submit scores on the Graduate Record Exami-

nation Aptitude Test. Admission to the program is not contingent on previous anthropological course work or any other specific program of study at the undergraduate level.

The department offers a program of specialization in social/cultural anthropology and a program of specialization in physical anthropology. The emphasis of the social/cultural anthropology program is the application of a theoretical and comparative perspective to research in complex societies. Within this perspective, a wide range of interests is represented in the department. The emphasis of the physical anthropology program is primate evolution; areas of concentration include comparative morphology of human and nonhuman primates and primate social behavior.

Curriculum is tailored to the individual student's background, academic needs, and research goals; pursuit of relevant cross-disciplinary study, within and outside the department, is expected. However, a modest number of courses is required of students in both programs. Candidates for the Ph.D. degree must demonstrate competence in their chosen subfield of specialization and knowledge of the broad theoretical perspectives, from all relevant disciplines, which inform their area of concentration.

Further details of the graduate program in anthropology, the departmental facilities, the staff, and various stipends available are described in the *Guidelines for Graduate Students in Anthropology* which may be obtained from the Director of Graduate Studies.

Courses of Instruction

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|---|--|
| 201S. Marxism and Anthropology | 243S. Theory and Method in Archaeology |
| 204S. The Anthropology of Cities | 244S. Primate Behavior |
| 205. The Anthropology of Anthropology | 246S. The Primate Fossil Record |
| 206S. Current Theoretical Schools in Anthropology | 258S. Symbols in Society |
| 211S. Ethnography of Communication | 267. Cognitive Anthropology |
| 215S. The Anthropology of Women: Theoretical Issues | 280S, 281S. Seminar in Selected Topics |
| 228S. Slavery and Society | 282S. Canada |
| 234S. Political Economy of Development: Theories of Change in the Third World | 330S, 331S. Theories in Sociocultural Anthropology |
| 237S. Interpretations of Kinship | 393. Individual Research in Anthropology |
| 239. Culture and Ideology | |
| 241. The Rise of Civilization in Mesopotamia and Iran | |

Courses Currently Unscheduled

- 275S. Inequality in Precapitalist Societies
334. Topics in Physical Anthropology

Art and Art History

Professor John R. Spencer, Ph.D. (Yale), *Director of Graduate Studies*

Associate Professor

Rona Goffen, Ph.D. (Columbia)

Assistant Professors

Caroline A. Bruzelius, Ph.D. (Yale), *Andrew W. Mellon Assistant Professor of Art*; Elizabeth G. Higdon, Ph.D. (Bryn Mawr)

Professor Emeritus

Sidney David Markman, Ph.D. (Columbia)

Graduate work in the Department of Art and Art History is offered leading to the A.M. degree in art history and is designed to provide basic training in the history of art with specialization in a given field selected by the student after consultation with and approval by the Director of Graduate Studies. Prospective students should present a minimum of 24 semester hours of undergraduate work in the history of art. In

special cases a student who does not fulfill this prerequisite may be required to attend prescribed undergraduate courses. A reading knowledge of one foreign language (preferably German) is required; candidates who do not meet this requirement upon admission to the program are expected to do so by the end of their first term in residence.

The program for the A.M. degree in art history consists of 30 units as follows: 12 units in art history; 6 units in an approved minor; 6 units in the major or minor, or other approved subject; and 6 units in thesis. A written thesis is required.

Courses of Instruction

230S. Medieval and Byzantine Art and Architecture
232S. Romanesque and Gothic Art and Architecture
234. Medieval Architecture
235. Gothic Cathedrals
241. Fifteenth-Century Italian Art
242S. Studies in Italian Renaissance Art
243S. Studies in Northern Art
248. Art of Northern Europe in the Fifteenth and Sixteenth Centuries
249. Death in Art
251. Italian Baroque Art
252. Northern Baroque Painting
262S. Problems in Nineteenth-Century Art
274. The History of Impressionism

275. Surrealism
276S. Problems in Modern Art
278. Twentieth-Century Criticism
293S. Methods in Art History
294, 295. Special Problems in Art History

Courses Currently Unscheduled

220S. Greek Painting
227. Early Christian Culture: Evidence of Art and Literature
231. Byzantine Art and Architecture
240. Italian Art
245. Sixteenth-Century Italian Art
277S. Contemporary Art
279S. Problems in Modern Architecture

Asian Languages

The courses are offered as an enrichment for students interested in the South Asian subcontinent. See the announcement for the Asian-Pacific Studies Institute in this bulletin in the section on special programs. For courses in Chinese and Japanese, see the *Bulletin of Duke University: Undergraduate Instruction*.

Biochemistry

Professor Robert L. Hill, Ph.D. (Kansas), *James B. Duke Professor of Biochemistry and Chairman*
Professor Lewis M. Siegel, Ph.D. (Johns Hopkins), *Director of Graduate Studies*

Professors

Robert Bell, Ph.D. (California at Berkeley); Irwin Fridovich, Ph.D. (Duke), *James B. Duke Professor of Biochemistry*; Samson R. Gross, Ph.D. (Columbia); Walter R. Guild, Ph.D. (Yale); Henry Kamin, Ph.D. (Duke); Nicholas M. Kredich, M.D. (Michigan); Robert J. Lefkowitz, M.D. (Columbia); Kenneth S. McCarty, Ph.D. (Columbia); Patrick A. McKee, M.D. (Oklahoma); Paul L. Modrich, Ph.D. (Stanford); K. V. Rajagopalan, Ph.D. (Univ. of Madras); Leonard Spicer, Ph.D. (Yale); Robert E. Webster, Ph.D. (Duke)

Associate Professors

Ronald C. Greene, Ph.D. (California Inst. of Tech.); Arno L. Greenleaf, Ph.D. (Harvard); Bernard Kaufman, Ph.D. (Indiana); David C. Richardson, Ph.D. (Massachusetts Inst. of Tech.); Harvey J. Sage, Ph.D. (Yale); Deborah A. Steege, Ph.D. (Yale); James B. Sullivan, Ph.D. (Texas)

Assistant Professors

Michael S. Hershfield, M.D. (Pennsylvania); Tao-shih Hsieh, Ph.D. (California at Berkeley)

Professor Emeritus

Mary L. C. Bernheim, Ph.D. (Univ. of Cambridge)

Associate Medical Research Professor

Jane Richardson, M.A.T. (Harvard)

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate majors in chemistry, biology, mathematics, or physics are welcome, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and function, crystallography of macromolecules, nucleic acid structure and function, lipid biochemistry, membrane structure and function, molecular genetics, enzyme mechanisms, and neurochemistry. The Division of Genetics of the department, in cooperation with the University Program in Genetics, offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree.

Courses of Instruction

- | | |
|--|---|
| 200. General Biochemistry | 245L. Macromolecules, Ecology, and Evolution |
| 209-210. Independent Study | 259. Molecular Biology I: Protein and Membrane Structure/Function |
| 215. Genetic Mechanisms | 265S, 266S. Seminar |
| 219. Molecular and Cellular Bases of Differentiation | 268. Molecular Biology II: Nucleic Acids |
| 219S. Seminar | 276. Comparative and Evolutionary Biochemistry |
| 220L. Adaptations of Organisms to the Marine Environment | 286. Current Topics in Immunochemistry |
| 220S. Adaptations of Organisms to the Marine Environment | 288. The Carbohydrates and Lipids of Biological Systems |
| 222. Structure of Biological Macromolecules | 291. Physical Biochemistry |
| 224. Biochemistry of Development and Differentiation | 296. Biological Oxidations |
| 227. Introductory Biochemistry I: Intermediary Metabolism | 297. Intermediary Metabolism |
| 228. Introductory Biochemistry II: Biological Macromolecules | 299. Nutrition |
| | 345, 346. Biochemistry Seminar |
| | 347, 348. Seminar in Toxicology |

Botany

Professor William Lewis Culberson, Ph.D. (Wisconsin), *Hugo L. Blomquist Professor of Botany and Chairman*
Professor Richard B. Searles, Ph.D. (California at Berkeley), *Director of Graduate Studies*

Professors

Janis Antonovics, Ph.D. (Univ. Coll. of North Wales); Richard T. Barber, Ph.D. (Stanford); John E. Boynton, Ph.D. (California at Davis); Terry W. Johnson, Jr., Ph.D. (Michigan); Donald E. Stone, Ph.D. (California at Berkeley); Boyd R. Strain, Ph.D. (California at Los Angeles); Richard A. White, Ph.D. (Michigan); Robert L. Wilbur, Ph.D. (Michigan)

Associate Professors

Norman L. Christensen, Jr., Ph.D. (California at Santa Barbara); Kenneth R. Knoerr, Ph.D. (Yale); Joseph S. Ramus, Ph.D. (California at Berkeley); William H. Schlesinger, Ph.D. (Cornell); James N. Siedow, Ph.D. (Indiana)

Assistant Professors

Stephen A. Johnston, Ph.D. (Wisconsin); Brent Drennen Mishler, Ph.D. (Harvard)

Professors Emeriti

Lewis Edward Anderson, Ph.D. (Pennsylvania); William D. Billings, Ph.D. (Duke), *James B. Duke Professor Emeritus of Botany*; Henry Hellmers, Ph.D. (California at Berkeley); Paul J. Kramer, Ph.D. (Ohio State), *James B. Duke Professor Emeritus of Botany*; Aubrey Willard Naylor, Ph.D. (Chicago), *James B. Duke Professor Emeritus of Botany*; Jane Philpott, Ph.D. (Iowa)

Adjunct Professor

Chicita F. Culberson, Ph.D. (Duke)

Adjunct Assistant Professor

David T. Patterson, Ph.D. (Duke)

Graduate work in the Department of Botany is offered leading to the A.M. (non-thesis), M.S. (thesis), and Ph.D. degrees. Before undertaking graduate study in botany a student should have had in the undergraduate program at least 12 semester hours of botany beyond an elementary course, and related work in biological sciences. Some work in chemistry and physics will be desirable and, for some phases of botanical study, a necessity. The student's graduate program is planned to provide a broad basic training in the various fields of botany, plus intensive specialization in the field of the research problem.

Courses of Instruction

- 205. Molecular Biology and Genetics
- 209L. Lichenology
- 210L. Bryology
- 212L. Phycology
- 215L. Primary Productivity in the Seas
- 218. Barrier Island Ecology
- 219L. Benthic Marine Algae
- 221L. Mycology
- 225T, 226T. Special Problems
- 227. Introductory Biochemistry I: Intermediary Metabolism
- 228. Introductory Biochemistry II: Biological Macromolecules
- 232. Microclimatology
- 237L. Systematic Biology
- 242L. Systematics
- 245L. Plant Diversity
- 246L. Ecology of Plants
- 250L, S. Plant Biosystematics
- 251L. Plant Physiology
- 253. Biophysical Plant Physiology
- 258. Physiology of Growth and Development
- 260L. Plant Anatomy
- 261. Photosynthesis
- 263L. Tropical Seaweeds
- 265L. Physiological Plant Ecology
- 267L. Plant Community Ecology
- 268. Molecular Biology II: Nucleic Acids
- 269. Advanced Cell Biology
- 272. Ecosystem Analysis
- 280. Principles of Genetics
- 283. Extrachromosomal Inheritance
- 285S. Ecological Genetics
- 286. Evolutionary Mechanisms
- 287S. Macroevolution
- 293L. Population Biology
- 295S, 296S. Seminar
- 300. Tropical Biology: An Ecological Approach
- 330L. Environmental Monitoring and Instrumentation
- 359, 360. Research in Botany

Courses Currently Unscheduled

- 243S. Classification of Angiosperms
- 247L. Plant Ecology
- 344. Micrometeorology and Biometeorology Seminar

Related Programs

The University Program in Genetics. Genetics courses offered by the botany department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under Genetics—The University Program.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to Organization for Tropical Studies in the section on special programs.

The University Program in Marine Sciences. Interdisciplinary programs emphasizing marine botany are available. Refer to the announcement in this bulletin under Marine Sciences—The University Program.

Business Administration

Professor Thomas F. Keller, Ph.D. (Michigan), *R. J. Reynolds Industries Professor of Business Administration and Dean*

Professor James R. Bettman, Ph.D. (Yale), *Burlington Industries Professor of Business Administration and Director of Graduate Studies*

Professors

Helmy Baligh, Ph.D. (California at Berkeley); Kalman J. Cohen, Ph.D. (Carnegie-Mellon); John D. Forsyth, D.B.A. (Illinois); Dan J. Laughhunn, D.B.A. (Illinois); Arie Y. Lewin, Ph.D. (Carnegie-Mellon);

Richard C. Morey, Ph.D. (California at Berkeley); Thomas H. Naylor, Ph.D. (Tulane); John W. Payne, Ph.D. (California at Irvine); Richard Staelin, Ph.D. (Michigan), *Edward and Rose Donnell Professor of Business Administration*; W. Kip Viscusi, Ph.D. (Harvard); Robert L. Winkler, Ph.D. (Chicago)

Associate Professors

Joseph Battle, Ph.D. (Michigan); Richard M. Burton, D.B.A. (Illinois); Robert Capettini, Ph.D. (Illinois at Urbana-Champaign); David C. Dellinger, Ph.D. (Stanford); David A. Dittman, Ph.D. (Ohio State); Christine R. Hekman, Ph.D. (Chicago); Joel C. Huber, Ph.D. (Pennsylvania); John S. Hughes, Ph.D. (Purdue); John M. McCann, Ph.D. (Purdue); Wesley A. Magat, Ph.D. (Northwestern); Joseph B. Mazzola, Ph.D. (Carnegie-Mellon); Roger W. Schmenner, Ph.D. (Yale); James W. Vaupel, Ph.D. (Harvard)

Assistant Professors

Marian Burke, Ph.D. (California at Los Angeles); Ellen F. Cox, Ph.D. (California at Berkeley); Julie A. Edell, Ph.D. (Carnegie-Mellon); Grant W. Gardner, Ph.D. (Harvard); Robert E. Hoskin, Ph.D. (Cornell); Kirk R. Karwan, Ph.D. (Carnegie-Mellon); Christopher D. Piros, Ph.D. (Harvard); Lucy J. Reuben, Ph.D. (Michigan); William E. Ricks, Ph.D. (California at Berkeley); Herbert L. Schuette, Ph.D. (Michigan); Blair H. Sheppard, Ph.D. (Illinois at Champaign); Anne S. Tsui, Ph.D. (California at Los Angeles)

The Ph.D. in Business Administration program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results.

The program requires that doctoral candidates must acquire expertise in three disciplines: economics, behavioral science, and quantitative methods. In addition, each candidate must acquire knowledge at the M.B.A. level of at least three of the following functional areas: accounting, finance, marketing, and operations management. Competence in the three disciplines and the functional areas may be gained from the student's choice of course work, participation in seminars, and independent study. Each student takes a comprehensive examination at the end of the second year or at the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires three to four years of work beyond the bachelor's degree. Students entering the program with an M.B.A. or other advanced work may be able to reduce the time in residence by a year.

Refer to the *Bulletin of Duke University: The Fuqua School of Business* for a complete list of courses and course descriptions.

Courses of Instruction

- 510. Bayesian Inference and Decision
- 521. Organization Seminar: A Micro Focus
- 522. Organization Seminar: A Macro Focus
- 531. Financial Accounting Seminar
- 532. Management Accounting Seminar
- 551. Corporate Finance Seminar
- 552. Investment Seminar
- 561. Seminar in Quantitative Research in Marketing
- 562. Seminar in Behavioral Models in Marketing
- 571. Operations Strategy Seminar
- 572. Seminar in Operational and Technological Tactics
- 597. Dissertation Research
- 598. Independent Study
- 599. Directed Research

Courses Currently Unscheduled

- 309.1-.9. Research in Managerial Economics
- 319.1-.9. Research in Quantitative Methods
- 329.1-.9. Research in Organization Theory and Management
- 339.1-.9. Research in Information and Accounting Systems
- 349.1-.9. Research in Public Policy and Social Responsibility
- 359.1-.9. Research in Finance
- 369.1-.9. Research in Marketing
- 379.1-.9. Research in Production
- 392-393. Tutorial in Interdisciplinary Areas
- 397. Dissertation Research

The University Program in Cell and Molecular Biology

Professor Robert L. Hill, Ph.D. (Kansas), *James B. Duke Professor of Biochemistry* and *Director*
Associate Professor Bernard Kaufman, Ph.D. (Indiana), *Associate Director*

Professors

Peter K. Lauf, M.D. (Frieburg); Paul L. Modrich, Ph.D. (Stanford); R. Bruce Nicklas, Ph.D. (Columbia); Salvatore V. Pizzo, M.D., Ph.D. (Duke); Thomas C. Vanaman, Ph.D. (Duke)

Associate Professor

James N. Siedow, Ph.D. (Indiana)

Assistant Medical Research Professor

Richard B. Marchase, Ph.D. (Johns Hopkins)

Faculty: A complete list of faculty, including research interests, will be made available to prospective students.

Research training in cell, developmental, and molecular biology is found in eight departments at Duke University: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. To effectively utilize this broad spectrum of expertise for the training of promising young scientists while still providing a coherent curriculum, the Duke University Program in Cell and Molecular Biology has been established.

During the first year of doctoral study a student will complete the program's three-course sequence presenting current understanding and research activities in cell biology and the molecular biology of nucleic acids, proteins, and membranes. Each student will also affiliate with a department, fulfill departmental requirements, and choose elective courses in an area of specialization. Research training is stressed throughout the program and dissertation research usually begins by the third semester. Normally the dissertation adviser will be chosen from within the student's own department but, depending on the student's research interests, dissertation research with an adviser in another department may be approved.

Prospective students may apply directly to the Cell and Molecular Biology Program or to one of the eight participating departments. Those who apply to the program must also designate a departmental preference. Applicants must have demonstrated, in addition to overall academic excellence, a proficiency in the biological and physical sciences. Applications for admission and fellowship support must be received by February 1, but early applications may receive earlier consideration.

Courses of Instruction

259. Molecular Biology I: Protein and Membrane
Structure/Function
264. Cell and Molecular Biology Seminar

268. Molecular Biology II: Nucleic Acids
269. Advanced Cell Biology

Chemistry

Professor Charles H. Lochmüller, Ph.D. (Fordham), *Chairman*

Associate Professor Steven Baldwin, Ph.D. (California Inst. of Tech.), *Director of Graduate Studies*

Professors

Edward M. Arnett, Ph.D. (Pennsylvania), *R. J. Reynolds Industries Professor of Chemistry*; Donald B. Chesnut, Ph.D. (California Inst. of Tech.); Bertram O. Fraser-Reid, Ph.D. (Alberta); Peter W. Jeffs, Ph.D. (Univ. of Natal); William R. Krigbaum, Ph.D. (Illinois), *James B. Duke Professor of Chemistry*; Andrew T. McPhail, Ph.D. (Univ. of Glasgow); Richard A. Palmer, Ph.D. (Illinois); Jacques C. Poirier, Ph.D. (Chicago); Ned Allen Porter, Ph.D. (Harvard); Louis DuBose Quin, Ph.D. (North Carolina at Chapel Hill), *James B. Duke Professor of Chemistry*; Peter Smith, Ph.D. (Univ. of Cambridge); Howard Austin Strobel, Ph.D. (Brown); Richard L. Wells, Ph.D. (Indiana); Pelham Wilder, Jr., Ph.D. (Harvard)

Associate Professors

Alvin L. Crumbliss, Ph.D. (Northwestern); Robert W. Henkens, Ph.D. (Yale); Barbara R. Shaw, Ph.D. (Washington)

Assistant Professors

C. William Anderson, Ph.D. (Cincinnati); Richard A. MacPhail, Ph.D. (California at Berkeley); Daniel D. Sternbach, Ph.D. (Brandeis)

Adjunct Professors

Robert G. Ghirardelli, Ph.D. (California Inst. of Tech.); Colin G. Pitt, Ph.D. (Univ. of London); Bernard Spielvogel, Ph.D. (Michigan)

Adjunct Assistant Professor

Mary Ellen Switzer, Ph.D. (Illinois)

In the Department of Chemistry graduate work is offered leading to the M.S. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

Courses of Instruction

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|--|--|
| 201. Molecular Spectroscopy | 313. Special Topics in Inorganic Chemistry |
| 203. Quantum Chemistry | 320. Synthetic Organic Chemistry |
| 205. Structure and Reaction Dynamics | 322. Organic Reactive Intermediates |
| 207. Principles of Kinetics, Thermodynamics, and Diffraction | 324. Special Topics in Organic Chemistry |
| 275, 276. Advanced Studies | 330. Separation Science and Fundamental Electrochemistry |
| 300. Basic Statistical Mechanics | 331, 332. Special Topics in Analytical Chemistry |
| 302. Basic Quantum Mechanics | 334. Chemical Instrumentation and Practical Electrochemistry |
| 303, 304. Special Topics in Physical Chemistry | 373, 374. Seminar |
| 310. Theoretical and Structural Inorganic Chemistry | 375, 376. Research |
| 312. Inorganic Reactions and Mechanisms | 377. Research Orientation Seminar |

Classical Studies

Professor Lawrence Richardson, Jr., Ph.D. (Yale), *James B. Duke Professor of Latin in Classical Studies and Chairman*

Associate Professor John G. Younger, Ph.D. (Cincinnati), *Director of Graduate Studies*

Professors

Francis Newton, Ph.D. (North Carolina at Chapel Hill); John F. Oates, Ph.D. (Yale); William H. Willis, Ph.D. (Yale)

Associate Professors

Peter Burian, Ph.D. (Princeton); Kent J. Rigsby, Society of Fellows (Harvard); Dennis Keith Stanley, Jr., Ph.D. (Johns Hopkins)

Assistant Professor

Mary T. Boatwright, Ph.D. (Michigan)

The Department of Classical Studies offers graduate work leading to the A.M. and Ph.D. degrees. For regular admission, students should offer three years of college study in one of the classical languages and two college years in the other. Upon matriculation all students take a diagnostic examination in Greek and Latin to determine the appropriate language and literature courses for further study.

A reading knowledge of French and German is required of all candidates for the Ph.D. The candidate should meet one of the language requirements by the end of the first term in residence and the other by the end of the third term.

The department expects the typical student, before beginning the dissertation, to have taken the equivalent of at least six Greek and/or Latin courses, five history courses, and two art and archaeology courses. The department maintains one of the country's major collections of Greek and Latin manuscripts and papyri, and an excellent study collection of Greek and Roman art. The Director of Graduate Studies will provide on request a brochure detailing further information about the department's special requirements in course work, preliminary examinations, and thesis and dissertation writing; prospective students should also consult the general requirements of the University set forth in this bulletin.

Greek

Courses of Instruction

- 200. Graduate Reading
- 203. Homer
- 205. Greek Lyric Poets
- 206. Aeschylus
- 210. Aristophanes
- 221. Early Greek Prose
- 226. Orators
- 301. Seminar in Greek Literature I
- 302. Seminar in Greek Literature II
- 321. Seminar in Literary Papyri
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 209. Euripides
- 222. Thucydides
- 313. Proseminar in Greek Epigraphy

Latin

Courses of Instruction

- 200. Graduate Reading
- 201. The Verse Treatise
- 202. Early Latin
- 203. Epic: Vergil
- 210. Lyric and Occasional Poetry
- 211. Elegiac Poets
- 215. The Historians
- 221. Medieval Latin
- 301. Seminar in Latin Literature I
- 302. Seminar in Latin Literature II
- 312. Proseminar in Latin Paleography
- 314. Proseminar in Latin Epigraphy
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 204. Epic
- 315. Proseminar in Roman Law

Classical Studies

Courses of Instruction

- 301. Proseminar in Classical Studies

Classical Studies (Ancient History)

Courses of Instruction

- 256. The Fourth Century through Alexander
- 258. Social and Cultural History of the Graeco-Roman World
- 261. The Roman Revolution, 146-30 B.C.
- 321. Seminar in Ancient History I
- 322. Seminar in Ancient History II
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 327. Seminar in Byzantine History

Classical Studies (Archaeology)

Courses of Instruction

- 233. Greek Architecture
- 234. Roman Sculpture
- 235S. Roman Architecture
- 236S. Roman Painting
- 311. Archaeology Seminar I
- 312. Archaeology Seminar II

Courses Currently Unscheduled

- 231S. Greek Sculpture
- 232S. Greek Painting

Under the terms of a cooperative agreement, graduate students of Duke University may take any graduate course offered by the Department of Classics of the University of North Carolina. A list of these courses will be sent upon request.

Computer Science

Professor Donald Rose, Ph.D. (Harvard), *Chairman*

Professor Donald W. Loveland, Ph.D. (New York Univ.), *Director of Graduate Studies*

Professors

Thomas M. Gallie, Ph.D. (Rice); Peter N. Marinos, Ph.D. (North Carolina State); Merrell L. Patrick, Ph.D. (Carnegie Inst. of Tech.); Arnold L. Rosenberg, Ph.D. (Harvard); Charles Starmer, Ph.D. (North Carolina at Chapel Hill); Kishor S. Trivedi, Ph.D. (Illinois); Senol Utku, Sc.D. (Massachusetts Inst. of Tech.); Max A. Woodbury, Ph.D. (Michigan)

Associate Professors

Bruce W. Ballard, Ph.D. (Duke); Alan W. Biermann, Ph.D. (California at Berkeley); Gershon Kedem, Ph.D. (Wisconsin); Robert A. Wagner, Ph.D. (Carnegie-Mellon)

Assistant Professors

Craig C. Douglas, Ph.D. (Yale); Joanne Bechta Dugan, Ph.D. (Duke); Shimon Even, Ph.D. (Harvard); Connie U. Smith, Ph.D. (Texas)

Associate Research Professors

J. Mailen Kootsey, Ph.D. (Brown); Dietolf Ramm, Ph.D. (Duke)

Adjunct Assistant Professor

Jonathan B. Rosenberg, Ph.D. (Duke)

The Department of Computer Science offers programs leading to the A.M. and Ph.D. degrees. The Ph.D. program is a joint offering with the computer science department of the University of North Carolina at Chapel Hill.

A student entering graduate work in computer science should have had three semesters of calculus and one semester of linear algebra, and have a knowledge of data structures, and of assembler as well as higher-level computer programming languages. Research interests of present faculty include mathematical foundations of computer science, artificial intelligence, analysis of algorithms, programming methodology, real-time computing, operating data base systems, computer systems design and analysis, parallel processing systems, scientific computation (including numerical analysis), and very large-scale integration.

Courses of Instruction

- 200. Programming Methodology I
- 201. Programming Languages
- 202. Applied Discrete Structures
- 204. Computer Network Architecture
- 207. Fault-Tolerant Computer Systems
- 208. Digital Computer Design
- 209. Microprocessor Fundamentals and Applications
- 210. VLSI Systems: an Introduction
- 215. Artificial Intelligence
- 221. Numerical Analysis I
- 222. Numerical Analysis II
- 224. Analysis of Algorithms
- 225. Formal Languages and Theory of Computation
- 226. Mathematical Methods for Systems Analysis I
- 227. Mathematical Methods for Systems Analysis II
- 231. Introduction to Operating Systems
- 232. Compiler Construction
- 241. Data Base Methodology
- 252. Computer Systems Organization
- 265. Advanced Topics in Computer Science
- 308. Advanced Topics in Digital Systems
- 310. CMOS VLSI Design

- 315. Advanced Topics in Artificial Intelligence
- 316. Computational Linguistics
- 320. VLSI Algorithmics
- 326. Systems Modeling
- 331. Operating Systems Theory

Courses Currently Unscheduled

- 301. Topics in Programming Theory
- 321. Topics in Numerical Mathematics
- 325. Theory of Computation
- 332. Topics in Operating Systems

Supplementary Courses Offered at UNC-CH

- Comp 145. Software Engineering Laboratory
- Comp 171. Natural Language Processing
- Comp 230. File Management Systems
- Comp 236. Computer Graphics
- Comp 238. Raster Graphics
- Comp 254. Picture Processing and Pattern Recognition
- Comp 265. Architecture of Computers

Economics

Professor Eliot Roy Weintraub, Ph.D. (Pennsylvania), *Chairman*

Professor Henry Grabowski, Ph.D. (Princeton), *Director of Graduate Studies*

Professors

Charles T. Clotfelter, Ph.D. (Harvard); Philip J. Cook, Ph.D. (California at Berkeley); David G. Davies, Ph.D. (California at Los Angeles); John F. Geweke, Ph.D. (Minnesota); S. Malcolm Gillis, Ph.D. (Illinois); Craufurd D. Goodwin, Ph.D. (Duke), *James B. Duke Professor of Economics*; Daniel A. Graham, Ph.D. (Duke); Thomas M. Havrilesky, Ph.D. (Illinois); Allen C. Kelley, Ph.D. (Stanford); Edward Tower, Ph.D. (Harvard); Vladimir G. Trembl, Ph.D. (North Carolina at Chapel Hill); John M. Vernon, Ph.D. (Massachusetts Inst. of Tech.); Thomas D. Wallace, Ph.D. (Chicago), *James B. Duke Professor of Economics*; William P. Yohe, Ph.D. (Michigan)

Associate Professors

Neil Barry de Marchi, Ph.D. (Australian National Univ.); Marjorie McElroy, Ph.D. (Northwestern); George E. Tauchen, Ph.D. (Minnesota)

Assistant Professors

Philip L. Brock, Ph.D. (Stanford); Cecilia A. Conrad, Ph.D. (Stanford); Robert Franklin Conrad, Ph.D. (Wisconsin); Kent P. Kimbrough, Ph.D. (Chicago); Michael I. Luger, Ph.D. (California at Berkeley); Robert C. Marshall, Ph.D. (California at San Diego); David Bruce Nickerson, Ph.D. (Northwestern); Sudhir Shetty, Ph.D. (Cornell); Dale O. Stahl II, Ph.D. (California at Berkeley); Gary A. Zarkin, Ph.D. (Chicago)

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. Among the undergraduate courses of distinct advantage to the graduate student in economics are statistics, economic theory, and basic courses in philosophy, mathematics, and social sciences other than economics. Advanced work in mathematics or statistics is also useful.

Requirements for the Ph.D. degree in economics include courses in economic theory, quantitative methods, and econometrics in the first year, and at the end of the second year, an examination in economic analysis. In addition, a student must obtain certification in three fields, one of which may be in an outside minor. The student may select from advanced economic theory, history of political economy, economic development, economic history, international economics, money and banking, labor economics, public finance, industrial organization, econometrics, statistics, Soviet economics, corporate economics, and certain fields outside the economics department (e.g., demography). Course work for the Ph.D. degree should be completed in five semesters of residence.

Courses of Instruction

200. Capitalism and Socialism
201S, 202S. Current Issues in Economics
204S. Advanced Monetary Economics
205S. Advanced Monetary Theory and Policy
212S. Economic Science and Economic Policy
213S.1. The Economics of Slavery in the American South
218. Macroeconomic Policy
219S. Economic Problems of Underdeveloped Areas
232. Analytical Methods IV: Topics in Economic Policy
233. Federal, State, and Local Finance and Economic Policies
234. Urban and Regional Economics
237. Statistical Methods
237. Econometrics I
244. Corporate Economics I

245. Econometrics II
246. Selected Topics in Econometric Theory
247S. Applied Econometrics
250S. Modern Economic Thought
265S. International Trade and Finance
268. Federal Tax Policy
286S. Economic Policy Making in Developing Countries
287. Public Finance
293. Soviet Economic History
294S. Soviet Economic System
301. Microeconomic Analysis I
302. Microeconomic Analysis II
304, 305. Monetary Theory and Policy
307. Quantitative Analysis I
308. Quantitative Analysis II
311, 312. History of Political Economy
313, 314. Seminar in Economic Theory

- 317. Seminar in Demographic, Population, and Resource Problems (Development Economics I)
- 319. Seminar in the Theory and the Problems of Economic Growth and Change (Development Economics II)
- 320. Macroeconomic Analysis I
- 322. Macroeconomic Analysis II
- 323. Income Distribution Theory
- 324, 325. Economics of the Law
- 329. Federal Finance
- 330. Seminar in Public Finance
- 350. Modern Economic Thought
- 355. Seminar in Labor Economics
- 358. Seminar in Labor Market and Related Analysis
- 359. Economic Analysis of Legal Issues
- 365. Seminar in International Trade Theory and Policy
- 366. Seminar in International Monetary Theory
- 380. Graduate Economics Workshops

- 388. Industrial Organization
- 389. Seminar in Industrial and Governmental Problems
- 397, 398. Directed Research

Courses Currently Unscheduled

- 235. The Economics of Crime, Law Enforcement, and Justice
- 285. Evaluation of Public Expenditures
- 303. Theory of Economic Decision Making
- 316. Seminar in Economics of Soviet-Type Socialism
- 321. Theory of Quantitative Economic Policy
- 331. Seminar in Economic History
- 345, 346. Demographic Techniques I and II
- 401. Seminar on the British Commonwealth
- 402. Interdisciplinary Seminar in the History of the Social Sciences

Related Courses in Other Departments

Courses in related fields may be selected from anthropology, computer science, forestry, history, mathematics, philosophy, political science, public policy studies, and sociology, or from an area that complements the candidate's area of research interests in economics. See also the section on the Center for Demographic Studies under "Special Programs" in this bulletin.

Education

Associate Professor Lucy T. Davis, Ed.D. (Columbia), *Chairman*
 Professor W. Scott Gehman, Jr., Ph.D. (Pennsylvania State), *Director of Graduate Studies*

Professor

Ellis B. Page, Ed.D. (California at Los Angeles)

Associate Professors

Robert H. Ballantyne, Ed.D. (Washington State); Peter F. Carbone, Ed.D. (Harvard); Joseph Di Bona, Ph.D. (California at Berkeley); Charles B. Johnson, Ed.D. (Duke); Robert N. Sawyer, Ed.D. (Wyoming)

Adjunct Associate Professor

Robert A. Pittillo, Jr., Ed.D. (Duke)

Lecturers

John A. Fowler, M.D. (Bowman Gray); Richard H. Leach, Ph.D. (Princeton)

Qualified juniors, seniors, and graduate students may enroll in appropriate education courses as electives. Further information may be obtained from the Director of Graduate Studies.

Courses of Instruction

- 211. Education and the Mass Media
- 215S. Secondary Education: Principles
- 216. Secondary Education: Internship
- 225. The Teaching of History and the Social Studies
- 227. Contemporary Theories of Counseling and Psychotherapy
- 232. Psychoeducational Counseling with Families
- 236. Teaching Developmental and Remedial Reading in the Secondary School

- 242. Group Counseling
- 246. Teaching of Mathematics
- 276. Teaching of High School Science
- 350, 351. Directed Activities in Education
- 357. Directed Research

Courses Currently Unscheduled

- 205. Selected Topics
- 248. Practicum in Counseling

Engineering

Professor Earl H. Dowell, Sc.D. (Massachusetts Inst. of Tech.), *Dean*

The School of Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees with a major in biomedical, civil and environmental, or electrical engineering, or in mechanical engineering and materials science. These programs are designed to provide a fundamental understanding of the engineering sciences, which are based on mathematics and the physical sciences, and to develop experience in the art of engineering, which includes strong elements of intuition, imagination, and judgment. Engineering graduate students may participate in seminars appropriate to their fields of study.

A minimum of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (usually mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department, and 6 for a research-based thesis. A nonthesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A minimum of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree. In civil and environmental engineering and electrical engineering, 24 units are required in the major field and 12 units in a related minor field (often mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department, and 12 for a research-based dissertation. In biomedical and mechanical engineering there are no specific course requirements; each program is planned to meet individual needs. Doctoral students are required to pass qualifying and preliminary examinations which may be either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

Biomedical Engineering

Professor James H. McElhaney, Ph.D. (West Virginia), *Chairman*

Professor Robert Plonsey, Ph.D. (California at Berkeley), *Director of Graduate Studies*

Professors

Roger C. Barr, Ph.D. (Duke); Howard G. Clark, Ph.D. (Maryland); William E. Hammond, Ph.D. (Duke); Robert M. Hochmuth, Ph.D. (Brown); Charles H. Lochmüller, Ph.D. (Fordham); Loren W. Nolte, Ph.D. (Michigan); Theo C. Pilkington, Ph.D. (Duke); Frederick L. Thurstone, Ph.D. (North Carolina State); Olaf T. von Ramm, Ph.D. (Duke); Myron L. Wolbarsht, Ph.D. (Johns Hopkins)

Associate Professor

Donald S. Burdick, Ph.D. (Princeton)

Assistant Professors

Christine E. Miller, Ph.D. (Stanford); Stephen J. Riederer, Ph.D. (Wisconsin)

Biomedical engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modeling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The goal of the graduate program in biomedical engineering is to combine training in advanced engineering, biomedical engineering, and the life sciences so that graduates of the program can contribute at the most advanced professional level. The doctoral dissertation should demonstrate significant and original contributions to an interdisciplinary

nary topic, accomplished as an independent investigator. The major, current, research areas are: biomechanics, biomedical materials, biomedical modeling, data acquisition and processing, medical imaging, and electrophysiology. Every biomedical engineering graduate student is required to serve as a teaching assistant as part of the graduate training.

Courses of Instruction

201. Electrophysiology
202. Biomedical Transfer Processes
205, 206. Microprocessors and Digital Instruments
211. Theoretical Electrophysiology
212. Theoretical Electrocardiography
215. Biomedical Materials and Artificial Organs
222. Principles of Ultrasound Imaging
230. Biomechanics
233. Modern Diagnostic Imaging Systems
235. Acoustics and Hearing
265. Advanced Topics in Biomedical Engineering

333. Biomedical Imaging
399. Special Readings in Biomedical Engineering

Courses Currently Unscheduled

204. Measurement and Control of Cardiac Electrical Events
207. Experimental Mechanics
221. Electrophysiological Techniques
243. Computers in Biomedical Engineering
311. Inverse Models

Civil and Environmental Engineering

Professor Robert J. Melosh, Ph.D. (Washington), *Chairman*

Associate Professor Henry J. Petroski, Ph.D. (Illinois), *Director of Graduate Studies*

Professors

Bruce J. Muga, Ph.D. (Illinois); Senol Utku, Sc.D. (Massachusetts Inst. of Tech.); P. Aarne Vesilind, Ph.D. (North Carolina at Chapel Hill); James F. Wilson, Ph.D. (Ohio State)

Associate Professors

Mrinmay Biswas, Ph.D. (Virginia); James D. Bryers, Ph.D. (Rice); Miguel A. Medina, Jr., Ph.D. (Florida); Eric I. Pas, Ph.D. (Northwestern); J. Jeffrey Peirce, Ph.D. (Wisconsin)

Assistant Professors

Carlos M. Marin, Ph.D. (Harvard); Kenneth H. Reckhow, Ph.D. (Harvard)

Adjunct Professor

Edward A. Saibel, Ph.D. (Massachusetts Inst. of Tech.)

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree: environmental engineering; geotechnical engineering and soil mechanics; mechanics of solids; materials engineering; fluid mechanics, water resources, and ocean engineering; structural engineering; and urban systems and transportation. Interdisciplinary programs combining study in some of the major areas with biological sciences, business administration, materials science, social sciences, political science, public policy studies, and other areas of engineering are also available.

With the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete an additional 6 units of course work plus a special project. If this alternative is elected, candidates are expected to take comprehensive examinations over their graduate course work, and also to defend orally their special projects.

Under the Reciprocal Agreement with Neighboring Universities, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although related work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social or managerial sciences may take relevant work in these areas.

Courses of Instruction

- 201. Advanced Mechanics of Solids
- 204. Plates and Shells
- 205. Elasticity
- 212. Mechanical Behavior and Fracture of Materials
- 215. Urban and Regional Systems Analysis
- 216. Transportation Planning and Policy Analysis
- 217. Transportation Systems Analysis
- 218. Engineering Management and Project Evaluation
- 225. Dynamic Engineering Hydrology
- 226. Operational Hydrology
- 227. Groundwater Hydrology and Contaminant Transport
- 232. Reinforced Concrete Design
- 233. Prestressed Concrete Design
- 234. Advanced Structural Design in Metals
- 235. Foundation Engineering
- 236. Earth Structures
- 241. Environmental Engineering Chemistry and Biology
- 243. Unit Operations in Water Treatment
- 245. Pollutant Transport Systems
- 246. Water Supply Design
- 248. Solid Waste and Resource Recovery Engineering
- 249. Control of Hazardous and Toxic Waste
- 251. Systematic Engineering Analysis
- 254. Applications of Finite Element Analysis

- 258. Analysis of Dynamic and Nonlinear Behavior of Structures
- 265. Advanced Topics in Civil and Environmental Engineering
- 280. Engineering Aspects of Physical Oceanography
- 281. Experimental System Engineering
- 282. Port, Harbor, and Coastal Engineering
- 283. Ocean System Dynamics
- 301, 302. Fall and Spring Seminars
- 399. Special Readings in Civil and Environmental Engineering

Courses Currently Unscheduled

- 202. Advanced Mechanics of Solids II
- 210. Intermediate Dynamics
- 221. Incompressible Fluid Flow
- 222. Open Channel Flow
- 223. Flow Through Porous Media
- 231. Structural Engineering Analysis
- 238. Rock Mechanics
- 239. Physical Properties of Soils
- 247. Air Pollution Control
- 306. Plasticity
- 336. Advanced Soil Mechanics
- 337. Elements of Soil Dynamics
- 350. Advanced Engineering Analysis

Electrical Engineering

Professor H. Craig Casey, Jr., Ph.D. (Stanford), *Chairman*

Professor Peter N. Marinos, Ph.D. (North Carolina State), *Director of Graduate Studies*

Professors

Richard B. Fair, Ph.D. (Duke); William T. Joines, Ph.D. (Duke); Robert B. Kerr, Ph.D. (Johns Hopkins); Loren W. Nolte, Ph.D. (Michigan); Harry A. Owen, Jr., Ph.D. (North Carolina State); Theo C. Pilkington, Ph.D. (Duke); Paul P. Wang, Ph.D. (Ohio State); Thomas G. Wilson, Sc.D. (Harvard)

Associate Professors

Herbert Hacker, Ph.D. (Michigan); Kishor S. Trivedi, Ph.D. (Illinois)

Assistant Professors

Christopher R. Carroll, Ph.D. (Calif. Inst. of Tech.); Rhett T. George, Jr., Ph.D. (Florida); Hisham Z. Massoud, Ph.D. (Stanford)

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: computer-aided design, computer engineering, detection and estimation theory, digital signal processing, electromagnetic fields and microwaves, integrated circuit design and fabrication, microprocessor systems, robotics and control systems, solid-state devices and materials, solid-state power conditioning, and VLSI circuit design.

Recommended prerequisites for the graduate courses in electrical engineering include a knowledge of basic mathematics and physics, electric networks, and system theory. Students in doubt about their background for enrollment in specific courses should discuss the matter with the Director of Graduate Studies. The M.S. degree program includes either a thesis or a project and an oral examination. A qualifying examination is required for the Ph.D. degree program. This examination is intended

to test both the breadth and depth of the student's understanding of basic electrical engineering concepts. There is no foreign language requirement.

Courses of Instruction

- 202. Digital Communication Systems
- 203. Random Signals and Noise
- 204. Computer Network Architecture
- 205. Signal Detection and Extraction Theory
- 206. Digital Signal Processing
- 207. Fault-Tolerant Computer Systems
- 208. Digital Computer Design
- 209. Microprocessor Fundamentals and Applications
- 210. Introduction to VLSI Systems
- 211. Quantum Mechanics
- 213. Modern Optics
- 214. Introduction to Solid-State Physics
- 215. Semiconductor Physics
- 216. Devices and Processing for Integrated Circuits
- 218. Integrated Circuit Engineering
- 219. Digital Integrated Circuits
- 224. Advanced Electronic Circuits
- 234. Power Electronics: High-Power Circuits
- 235. Nonlinear Magnetic and Semiconductor Power Converters
- 236. Energy-Storage Power Converters
- 241. Linear Systems
- 250. Introduction to Robotics
- 251. Pattern Classification and Recognition
- 252. Computer Systems Organization

- 253. Industrial Robotics
- 265. Advanced Topics in Electrical Engineering
- 271. Electromagnetic Theory
- 273. Optical Communication Systems
- 308. Advanced Topics in Digital Systems
- 310. CMOS VLSI Design
- 316. Advanced Physics of Semiconductor Devices
- 320. Integrated Circuit Fabrication Laboratory
- 399. Special Readings in Electrical Engineering

Courses Currently Unscheduled

- 217. Lasers
- 222. Nonlinear Analysis
- 226. Modeling/Computer-Aided Analysis of Electronic Systems
- 227. Network Synthesis
- 243. Advanced Linear Systems Theory
- 272. Electromagnetic Communication Systems
- 302. Applied Information Theory and Statistical Estimation
- 305. Advanced Topics in Signal Processing
- 317. Quantum Electronics
- 324. Nonlinear Oscillations in Physical Systems
- 342. Optimal Control Theory
- 371. Advanced Electromagnetic Theory
- 373. Selected Topics in Field Theory

Mechanical Engineering and Materials Science

Professor Jack B. Chaddock, Sc.D. (Massachusetts Inst. of Tech.), *Chairman*
Professor Charles M. Harman, Ph.D. (Wisconsin), *Director of Graduate Studies*

Professors

Adrian Bejan, Ph.D. (Massachusetts Inst. of Tech.); Franklin H. Cocks, Sc.D. (Massachusetts Inst. of Tech.); Earl H. Dowell, Sc.D. (Massachusetts Inst. of Tech.); Devendra P. Garg, Ph.D. (New York Univ.); Ulrich M. Gosele, Ph.D. (Max Planck Institut für Metallforschung, Stuttgart); George W. Pearsall, Sc.D. (Massachusetts Inst. of Tech.); Marion L. Shepard, Ph.D. (Iowa State)

Associate Professors

David D. Loendorf, Ph.D. (Michigan); Alicia V. Quinlan, Ph.D. (Massachusetts Inst. of Tech.); Edward J. Shaughnessy, Jr., Ph.D. (Virginia); Donald Wright, Ph.D. (Purdue)

Assistant Professors

Gale H. Buzzard, Ph.D. (North Carolina State); Marios Pouagare, Ph.D. (Pennsylvania State)

Associate Professor Emeritus

Ernest Elsevier, M.S. (Georgia Inst. of Tech.)

Adjunct Associate Professor

Ish Sud, Ph.D. (Duke)

Research Professor

Phillip L. Jones, Ph.D. (California at Los Angeles)

The department offers programs of study and research leading to the M.S. and Ph.D. degrees in both Mechanical Engineering and Materials Science. Current research areas available include: Heat transfer in free convection and in porous media,

two-phase transport processes, cooling of electronic equipment, thermal performance of buildings, power generation, thermal design by entropy minimization, solar energy utilization, environmental turbulence and laser-Doppler anemometry, electrohydrodynamics, aeroelasticity, chaotic motion, vibrations and acoustics of dynamic structures, nonlinear control systems, robotics, computer-aided design, finite element techniques, expert systems, failure analysis and prevention, positron annihilation spectroscopy, safe product design and product liability, polymer science, point defects and diffusion in semiconductors, electron energy transfer in solids and liquids, eco-dynamic systems engineering, thermokinetics and thermochemical control of biological processes, and applications of system dynamics to technology assessment.

Courses of Instruction

- 202. Engineering Thermodynamics
- 205. Biochemical Engineering
- 206. Optimization of Bioprocess Kinetics
- 211. Theoretical and Applied Polymer Science
- 213. Advanced Materials Science
- 214. Corrosion and Corrosion Control
- 215. Biomedical Materials and Artificial Organs
- 216. Materials Science and Solar Technology
- 217. Fracture of Engineering Materials
- 218. Thermodynamics and Thermokinetics of Materials
- 219. Applied Surface Science: Crystal Growth and Analytical Techniques
- 221. Compressible Fluid Flow
- 222. Heat Transfer
- 224. An Introduction to Turbulence
- 226. Intermediate Fluid Mechanics
- 227. Advanced Fluid Mechanics
- 230. Modern Control and Dynamic Systems
- 234. Advanced Computer-Aided Engineering
- 235. Advanced Mechanical Vibrations
- 236. Engineering Acoustics and Noise Control
- 240. Patent Technology and Law for Engineers
- 241. Analytical Mechanical Design
- 242. Data Base Methodology
- 254. Solar Energy Thermal Processes

- 265. Advanced Topics in Mechanical Engineering
- 277. Optimization Methods for Mechanical Design
- 302. Advanced Thermodynamics
- 323. Convective Heat Transfer
- 324. Conduction and Radiation Heat Transfer
- 331. Nonlinear Control Systems
- 399. Special Readings in Mechanical Engineering

Courses Currently Unscheduled

- 210. Intermediate Dynamics
- 223. Principles and Design of Heat Transfer Equipment
- 231. Systems Response and Control
- 232. Nonlinear Analysis
- 267. Energy Use in Educational Facilities
- 280. Nuclear Reactor Power Cycles
- 300. Advanced Projects in Mechanical Engineering
- 311. Behavior of Crystalline Solids
- 321. Gas Dynamics
- 322. Mechanics of Viscous Fluids
- 327. Homogeneous Turbulence
- 328. Turbulent Shear Flow
- 333. Seminar in Control Systems
- 335. Analytical Methods in Vibrations
- 372. Finite Element Techniques in Design

English

Professor George W. Williams, Ph.D. (Virginia), *Chairman*

Professor Carl Anderson, Ph.D. (Pennsylvania), *Director of Graduate Studies*

Professors

Louis J. Budd, Ph.D. (Wisconsin), *James B. Duke Professor of English*; Edwin H. Cady, Ph.D. (Wisconsin), *Andrew W. Mellon Professor in the Humanities*; Bernard I. Duffey, Ph.D. (Ohio State); Oliver W. Ferguson, Ph.D. (Illinois); Robert F. Gleckner, Ph.D. (Johns Hopkins); Wallace Jackson, Ph.D. (Pennsylvania); Frank Lentricchia, Ph.D. (Duke); Gerald Monsman, Ph.D. (Johns Hopkins); Holger O. V. Nygard, Ph.D. (California at Berkeley); Dale B. J. Randall, Ph.D. (Pennsylvania); Clyde de Loache Ryals, Ph.D. (Pennsylvania); Grover C. Smith, Ph.D. (Columbia); Victor H. Strandberg, Ph.D. (Brown); Kenny J. Williams, Ph.D. (Pennsylvania)

Associate Professors

Ronald Richard Butters, Ph.D. (Iowa); A. Leigh DeNeef, Ph.D. (Pennsylvania State); Gerald E. Gerber, Ph.D. (Northwestern); Buford Jones, Ph.D. (Harvard); Elgin W. Mellow, Ph.D. (London)

Assistant Professors

Joseph A. Porter, Ph.D. (California at Berkeley); Marianna Torgovnick, Ph.D. (Columbia)

Visiting Professor

D. W. Robertson, Ph.D. (North Carolina at Chapel Hill)

The department offers graduate work leading to the A.M. and Ph.D. degrees. A statement of the requirements for the A.M. and Ph.D. degrees may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of one foreign language for the A.M. degree; for the Ph.D. degree, two languages determined by the student's committee.

Courses of Instruction

- | | |
|--|---|
| 208. History of the English Language | 341. Studies in Romanticism |
| 209. Present-Day English | 347. Studies in Victorianism |
| 212. Middle English Literature: 1100 to 1500 | 348. Studies in a Major Nineteenth-Century Author |
| 221. Renaissance Prose and Poetry: 1500 to 1660 | 353. Studies in Modern British Literature |
| 225. Renaissance Drama: 1500 to 1642 | 361. Studies in American Literature before 1915 |
| 235. Restoration and Eighteenth-Century Literature: 1660 to 1800 | 368. Studies in a Major American Author before 1915 |
| 241. Romantic Literature: 1790 to 1830 | 375. Studies in Modern American Literature |
| 245. Victorian Literature: 1830 to 1900 | 376. Studies in a Modern Author (British or American) |
| 251. British Literature since 1900 | 381. Special Topics Seminar |
| 263. American Literature to 1865 | 383. Studies in Textual Criticism |
| 267. American Literature: 1865 to 1915 | 385. Studies in Literary Criticism |
| 275. American Literature since 1915 | 390. Seminar in the Teaching of Composition |
| 281. Studies in a Genre: The Novel | 391. Tutorial in Special Topics |
| 287. Major Critical Thought | 392. Tutorial in Journal Editing |
| 312. Studies in Middle English Literature | |
| 315. Studies in Chaucer | |
| 321. Studies in Renaissance Literature | |
| 324. Studies in Shakespeare | |
| 329. Studies in Milton | |
| 337. Studies in Augustanism | |
| 338. Studies in a Major Augustan Author | |

Courses Currently Unscheduled

310. Studies in Old English Literature
380. Studies in Ballad and Folksong

Tutorials

Specialized subjects of study will be offered, numbered in the 390s, to accommodate the interests of advanced graduate students. Tutorials will be offered to single students or to small groups. Instruction will be conducted in weekly sessions, or in more frequently scheduled sessions, if the instructor wishes. Emphasis will be on independent reading and investigation, and oral and written reports. A substantial amount of writing will be required.

Students are advised to consult the Director of Graduate Studies for a list of tutorials currently scheduled to be offered.

Forestry and Environmental Studies

Professor George F. Dutrow, Ph.D. (Duke), *Acting Dean*

Professor William J. Stambaugh, Ph.D. (Yale), *Director of Graduate Studies*

Professors

Benjamin A. Jayne, Ph.D. (Yale); Kenneth R. Knoerr, Ph.D. (Iowa)

Associate Professors

Norman L. Christensen, Jr., Ph.D. (California at Santa Barbara); William F. Hyde, Ph.D. (Michigan); Curtis J. Richardson, Ph.D. (Tennessee)

Assistant Professors

Daniel E. Binkley, Ph.D. (Oregon State); William C. Davis, Ph.D. (Yale); Richard T. Di Giulio, Ph.D. (Virginia Polytechnic Inst.); Lynn A. Maguire, Ph.D. (Utah State); Carlos M. Marin, Ph.D. (Harvard); Kenneth H. Reckhow, Ph.D. (Harvard); Jack P. Royer, Ph.D. (Cornell)

Professors Emeriti

Roger F. Anderson, Ph.D. (Minnesota); Henry Hellmers, Ph.D. (California at Berkeley); Jane Philpott, Ph.D. (Iowa)

Adjunct Professors

Stephen G. Boyce, Ph.D. (North Carolina State); William J. Hart, M.P.A. (Harvard)

Adjunct Assistant Professor

J. Michael Vasievich, Ph.D. (Duke)

Research Professor

James G. Yoho, Ph.D. (Michigan State)

Major and minor work is offered in the areas of natural resource science/ecology, natural resource systems science, and natural resource economics/policy. Programs of study and research lead to the A.M., M.S., and Ph.D. degrees. College graduates who have a bachelor's degree in one of the natural or social sciences, forestry, engineering, business, or environmental science will be considered for admission to a degree program. Students will be restricted to the particular fields of specialization for which they are qualified academically. Graduate School programs usually concentrate on some area of natural resource science/ecology, systems science, or economics/policy, while study in resource management is more commonly followed in one of the professional master's degree programs of the School of Forestry and Environmental Studies. For more complete program descriptions and information on professional training in forestry or environmental studies, the *Bulletin of Duke University: School of Forestry and Environmental Studies* should be consulted.

The specific degrees available in forestry and related natural resources through the Graduate School are: the A.M. (with or without a thesis), M.S. (with a thesis), and the Ph.D. Students majoring in forestry or environmental studies may be required to demonstrate satisfactory knowledge of one or two foreign languages for the Ph.D. degree.

Courses of Instruction

- | | |
|--|--|
| 200. Student Projects | 261. Remote Sensing for Resource Management |
| 201. Field Studies | 262. Forest Utilization |
| 204. Forest Inventory, Growth, and Yield | 263. Harvesting and Transportation Systems |
| 205. Silviculture | 264. Manufacturing Systems |
| 207. Forest Pest Management | 266. Ecology of Southern Appalachian Forests |
| 208. Fire Behavior and Use | 267. Wildland and Wildlife Management |
| 210L. Forest Pathology | 270. Resource Economics and Policy |
| 211L. Applied Ecology and Ecosystem Management | 283. Environmental Policy and Values |
| 212. Ecosystem Dynamics in Forest Productivity | 299. Independent Projects |
| 213. Forest Ecosystems | 301. Forest Nutrition Management |
| 215. Environmental Physiology | 302. Models in Forest Productivity |
| 216. Applied Population Ecology | 304. Forest Yield |
| 218. Barrier Island Ecology | 305. Harvesting Effects on Productivity |
| 221L. Forest Soils | 306. Choices in Silviculture |
| 230. Weather and Climate | 308. Tree Biology |
| 231. Environmental Climatology | 309. Forest Regeneration |
| 232. Microclimatology | 311. Ecological Toxicology |
| 234. Watershed Hydrology | 312. Wetlands Ecology |
| 236. Water Quality Management | 314. Integrated Case Studies in Toxicology |
| 237. Watershed Modeling and Management | 317. Applied Ecological Problem Solving |
| 251. Natural Resource Data Analysis | 318. Seminar in Ecotoxicology |
| 252. Computer Applications in Forestry | 319. Seminar in Natural Resource Ecology |

320. Seminar in Integrated Case Studies in Natural Resource Analysis
 322. Microbiology of Forest Soils
 330L. Environmental Monitoring and Instrumentation
 331. Water Resource Systems
 332. Air Quality Management and Modeling
 339. Seminar in Water Quality Modeling
 350. Statistical Estimation and Inference for Resource Management
 352. Matrix Methods for Resource Systems
 353. Analysis of Resource Systems
 355. Optimization Methods for Resource Management
 361. Forest Resource Management
 367. Seminar in Forest Resource Management

372, 373. Advanced Natural Resource Economics
 377. Seminar in Natural Resource Allocation and Efficiency
 381. Natural Resource Policy
 384. Special Tax Problems for Industrial Timberland Owners
 385. Decision Theory and Risk Analysis
 388. Seminar in Resource and Environmental Policy

Courses Currently Unscheduled

203. Silvics
 209. Forest Entomology
 310. Forest Productivity and Mineral Cycling
 338. Micrometeorology and Biometeorology Seminar

Genetics—The University Program

Professor Janis Antonovics, Ph.D. (Univ. Coll. of North Wales), *Director*

Professors

D. Bernard Amos, M.D. (Guys Hospital, London); John E. Boynton, Ph.D. (California at Davis); Sheila Counce, Ph.D. (Univ. of Edinburgh); Nicholas Gillham, Ph.D. (Harvard); Samson R. Gross, Ph.D. (Columbia); Walter R. Guild, Ph.D. (Yale); Wolfgang Karl Joklik, D. Phil. (Univ. of Oxford), *James B. Duke Professor of Microbiology and Immunology*; Nicholas M. Kredich, M.D. (Michigan); Paul L. Modrich, Ph.D. (Stanford); Montrose J. Moses, Ph.D. (Columbia); R. Bruce Nicklas, Ph.D. (Columbia); Calvin L. Ward, Ph.D. (Texas); Frances Ellen Ward, Ph.D. (Brown); Robert E. Webster, Ph.D. (Duke)

Associate Professors

Deepak Bastia, Ph.D. (Chicago); Sharyn Endow, Ph.D. (Yale); Ronald C. Greene, Ph.D. (California Inst. of Tech.); Arno L. Greenleaf, Ph.D. (Harvard); Jack D. Keene, Ph.D. (Washington at Seattle); Deborah A. Steege, Ph.D. (Yale)

Assistant Professors

Mary Vickers Burdett, Ph.D. (Georgetown); Michael S. Hershfield, M.D. (Pennsylvania); Edward W. Holmes, M.D. (Pennsylvania); Tao-shih Hsieh, Ph.D. (California at Berkeley); Stephen A. Johnston, Ph.D. (Wisconsin); Frederick H. Schachat, Ph.D. (Stanford); Marcy K. Uyenoyama, Ph.D. (Stanford)

Adjunct Professors

John W. Drake, Ph.D. (California Inst. of Tech.); Burke H. Judd, Ph.D. (California Inst. of Tech.); John Charles Lucchesi, Ph.D. (California at Berkeley)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Department of Botany).

Courses of Instruction

205. Molecular Biology and Genetics
 215. Molecular Genetics I: Genetic Mechanisms
 268. Molecular Biology II: Nucleic Acids
 280. Principles of Genetics
 283. Extrachromosomal Inheritance

285S. Ecological Genetics
 286. Evolutionary Mechanisms
 288. Mathematical Population Genetics
 336. Contemporary Topics in Immunogenetics
 350. Genetics Colloquium

Geology

Professor Ronald D. Perkins, Ph.D. (Indiana), *Chairman*

Professor S. Duncan Heron, Jr., Ph.D. (North Carolina at Chapel Hill), *Director of Graduate Studies*

Professor

Orrin H. Pilkey, Ph.D. (Florida State)

Associate Professors

Bruce Hayward Corliss, Ph.D. (Univ. of Rhode Island); Thomas C. Johnson, Ph.D. (California at San Diego); Bruce R. Rosendahl, Ph.D. (California at San Diego)

Assistant Professors

Paul A. Baker, Ph.D. (California at San Diego); Sherman Bloomer, Ph.D. (California at San Diego)

Adjunct Assistant Professor

Richard A. Strelitz, Ph.D. (Princeton)

The Department of Geology offers graduate work leading to the M.S. and Ph.D. degrees. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, igneous and metamorphic rocks, stratigraphy or sedimentation, and structural geology. In addition, the student must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology provide specialized training in the fields of facies analysis, geological oceanography, sedimentary petrology, paleobiology, geophysics, and low-temperature geochemistry.

An acceptable thesis is required. There is no language requirement for the M.S. degree.

Courses of Instruction

- 200. Beach and Coastal Processes
- 203. Physical Oceanography
- 204. Chemical Oceanography
- 205S. Geological Oceanography
- 206S. Principles of Geological Oceanography
- 208S. Paleoceanography
- 212. Carbonate Facies Analysis: Recent and Ancient
- 214S. Sedimentary Petrography
- 215. Clastics Facies Analysis: Recent and Ancient
- 216. Field Analysis of South Florida Carbonates
- 217. Field Analysis of Ancient Sedimentary Sequences
- 249. Marine Micropaleontology
- 251. Physics of the Earth

- 252. Exploration Seismology
- 255. Seismic Interpretation
- 260S. Hydrocarbon Exploration
- 270. Geochemistry
- 271. Low-Temperature Geochemistry
- 281S. Igneous Petrology
- 292. Computer Methods in Geology
- 295S. Advanced Topics in Geology
- 371, 372. Advanced Topics in Geology

Courses Currently Unscheduled

- 253S. Geophysics
- 254. Geophysical Field Methods

Germanic Languages and Literature

Associate Professor Frank Borchardt, Ph.D. (Johns Hopkins), *Chairman and Director of Graduate Studies*

Professor

Leland R. Phelps, Ph.D. (Ohio State)

Associate Professors

A. Tilo Alt, Ph.D. (Texas); James L. Rolleston, Ph.D. (Yale)

Assistant Professor

Sarah Westphal-Wihl, Ph.D. (Yale)

Visiting Professor

Harold R. Jantz, Ph.D. (Wisconsin)

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German as a related field should normally have completed a third-year course (in exceptional cases, a second year) of college German with acceptable grades.

Courses of Instruction

200S. Proseminar
201S, 202S. Goethe
205, 206. Middle High German
207S. German Romanticism
209S. Drama
211S. Nineteenth-Century Literature
214S. The Twentieth Century
215S. Seventeenth-Century Literature

216. History of the German Language
217S. Renaissance and Reformation Literature
218S. The Teaching of German
219. Applied Linguistics

Courses Currently Unscheduled

230S. Lyric Poetry
321, 322. Germanic Seminar

Health Administration

Professor Robert Taylor, Ph.D. (North Carolina at Chapel Hill), *Acting Chairman*
Professor David G. Warren, J.D. (Duke), *Director of Graduate Studies*

Professors

E. Harvey Estes, Jr., M.D. (Emory); B. Jon Jaeger, Ph.D. (Duke)

Associate Professors

David J. Falcone, Ph.D. (Duke); William E. Wilkinson, Ph.D. (North Carolina at Chapel Hill)

Assistant Professors

Anne L. Martin, Ph.D. (London); Donald S. Smith II, M.H.A. (Minnesota)

Adjunct Professors

Arnold D. Kaluzny, Ph.D. (Michigan); Robert E. Toomey, LL.D. (Clemson)

Adjunct Associate Professor

Robert G. Winfree, M.A. (Iowa)

Adjunct Assistant Professors

David B. Adcock, J.D. (Duke); Samuel C. Brown, M.E.A. (George Washington); David L. Cusic, M.H.A. (Duke), M.P.H. (North Carolina at Chapel Hill); Arlene J. Diosegy, J.D. (Temple); William J. Donelan, M.S. (Duke); Duncan Yaggy, Ph.D. (Brandeis)

Associate

Douglas Henderson-James, M.H.A. (Duke)

The Department of Health Administration offers graduate work leading to the M.H.A. degree. The graduate program is offered through two academic years and leads principally toward a career in the corporate management of complex health care delivery organizations. Students without previous administrative experience in the health field are encouraged to apply for a twelve-month administrative fellowship following graduation. Admission to the program is based upon the capability for graduate study and demonstrated leadership potential of the candidate.

Courses of Instruction

- 300. Health Systems and Medical Care
- 301. History of Health Care Delivery
- 303. Financial Management I
- 304. Financial Management II
- 305. Financial Management III
- 306. Techniques of Management I
- 307. Techniques of Management II
- 308. Cost-Benefit Analysis
- 309. Health Care Marketing Management
- 310. Statistical Analysis for Management Decisions
- 311. Employee Relations and the Law
- 312. Comparative Health Systems
- 313. Quantitative Decision Making
- 320. Economics I: Micro-Macro
- 321. Economics II: Health
- 322. Organizational Behavior and Design
- 331. Planning Health Services: Systems Planning
- 332. Institutional and Facilities Planning
- 344. Human Resources Management
- 345. Public Policy and Health Care
- 348. Legal Considerations in Health Administration
- 350. Practicum in Health Services Administration
- 352. Ambulatory Health Services
- 361, 362. Case Studies in Health Administration
- 367. Multi-Institutional Arrangements
- 371, 372. Directed Research
- 373. Current Legal Problems in Health Administration
- 375. Quality Assurance and Risk Management
- 383. Program Development, Monitoring, and Evaluation
- 387. Information Systems
- 388. Technology
- 389. Corporate Planning for Health Services Organizations

History

Professor Anne Firor Scott, Ph.D. (Radcliffe), *William K. Boyd Professor of History and Chairman*
Professor Warren Lerner, Ph.D. (Columbia), *Director of Graduate Studies*

Professors

Charles W. Bergquist, Ph.D. (Stanford); Clark R. Cahow, Ph.D. (Duke); John Cell, Ph.D. (Duke); William Chafe, Ph.D. (Columbia); Joel G. Colton, Ph.D. (Columbia); Calvin D. Davis, Ph.D. (Indiana); Robert F. Durden, Ph.D. (Princeton); Irving B. Holley, Jr., Ph.D. (Yale); Seymour Mauskopf, Ph.D. (Princeton); John F. Oates, Ph.D. (Yale); John F. Richards, Ph.D. (California at Berkeley); William E. Scott, Ph.D. (Yale); John J. TePaske, Ph.D. (Duke); Ronald Witt, Ph.D. (Harvard); Charles R. Young, Ph.D. (Cornell)

Associate Professors

Arif Dirlik, Ph.D. (Rochester); Raymond Gavins, Ph.D. (Virginia); Lawrence C. Goodwyn, Ph.D. (Texas); Bruce R. Kuniholm, Ph.D. (Duke); Martin Miller, Ph.D. (Chicago); Sydney Nathans, Ph.D. (Johns Hopkins); Alex Roland, Ph.D. (Duke); Peter H. Wood, Ph.D. (Harvard)

Assistant Professors

Thomas Barnett-Robisheaux, Ph.D. (Virginia); Peter C. English, M.D., Ph.D. (Duke); Janet J. Ewald, Ph.D. (Wisconsin); David B. Gaspar, Ph.D. (Johns Hopkins); Andrew Gordon, Ph.D. (Harvard); Cynthia B. Herrup, Ph.D. (Northwestern); William M. Reddy, Ph.D. (Chicago)

Professors Emeriti

John Hope Franklin, Ph.D. (Harvard), *James B. Duke Professor Emeritus of History*; Richard L. Watson, Ph.D. (Yale)

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. Candidates for the A.M. degree must have a reading knowledge of at least one ancient or modern foreign language related to their programs of study and have completed successfully a substantial research paper, normally the product of a year's seminar or two semester courses. The paper must be approved by two readers—the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 1.

Candidates for the degree of Doctor of Philosophy are required to prepare themselves for examinations in four fields. Three usually shall be history. The choice of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the fields of Africa,

Afro-American history, ancient history, medieval and early modern Europe, modern Europe, American history, Britain and the Commonwealth, Imperial Russia, Soviet Russia, Latin America, South Asia, China, modern Japan, military history, history of science, and history of medicine. The candidate for the Ph.D. degree usually must have a reading knowledge of two foreign languages, but in certain cases where the candidate's supervisor and the Director of Graduate Studies approve, and where the candidate's research for the dissertation would appreciably benefit, an alternative to the second language may be accepted. This alternative usually would take the form of successfully completed formal training in an auxiliary discipline (such as statistics or a course in one of the other social sciences with an emphasis upon methodology) of 3 to 6 units, or the equivalent, depending on the student's program. It also must be in addition to any previous undergraduate work in the discipline. The requirement, whether satisfied by two languages or by one language and an alternative, must be met prior to the preliminary examination.

Ancient History. For courses in ancient history which may be taken for credit in either history or classical studies, see Classical Studies.

Courses of Instruction

- 201S. Aspects of Change in Prerevolutionary Russia
- 202S. The Russian Revolution
- 215-216. The Diplomatic History of the United States
- 217S, 218S. Western Europe in the Twentieth Century
- 219S, 220S. History of Science and Technology
- 221. Problems in the Economic and Social History of Europe, 1200-1700
- 222. Problems in the Intellectual History of the European Renaissance and Reformation
- 227-228. Recent United States History: Major Political and Social Movements
- 229S, 230S. Revolution in Modern Europe, 1789-1919
- 231S, 232S. Problems in the History of Spain and the Spanish Empire
- 234S. Political Economy of Development: Theories of Change in the Third World
- 237S. Europe in the Early Middle Ages
- 238S. Europe in the High Middle Ages
- 239S. History of Socialism and Communism
- 241-242. United States Constitutional History
- 243-244. Marxism and History
- 247. History of Modern India and Pakistan, 1707-1857
- 248. History of Modern India and Pakistan, 1857 to the Present
- 249-250. Social and Intellectual History of the United States
- 253S, 254S. European Diplomatic History, 1871-1945
- 260S. Economic History of Japan

- 262. Problems in Soviet History
- 265S. Problems in Modern Latin American History
- 269S-270S. British History, Seventeenth Century to the Present
- 273S, 274S. Topics in the History of Science
- 277S. The Coming of the Civil War in the United States, 1820-1861
- 278S. The Civil War in the United States and Its Aftermath, 1861-1900
- 279, 280. Health, Healing, and History
- 282S. Canada
- 285S, 286S. Oral History
- 301-302. Research Seminar in History
- 307-308. Seminar in United States History
- 312. Seminar in the Teaching of History in College
- 314. Historical and Social Science Methodology
- 351-352. Colloquia
- 371-372. Research Seminars
- 392. Tutorial in Journal Editing
- 399. Independent Study

Courses Currently Unscheduled

- 205S. Progressive Era in the United States and World War I
- 206S. The Nineteen-Twenties and the New Deal in the United States
- 235. The Antebellum South
- 236. The Reconstruction Era
- 267S-268S. From Medieval to Early Modern England
- 317, 318. Seminar in the History of Western Europe
- 401. Seminar on the British Commonwealth

Humanities—The Master of Arts Program

Associate Professor Peter Burian, Ph.D. (Princeton), *Director*

The Master of Arts Program in Humanities is an interdepartmental program and is tailored to the needs of individual students. The candidate defines a theme and selects appropriate course work with the aid and approval of a supervising committee. Thirty units of course work are required for completion of the program. The

degree may be earned with or without a thesis. The candidate who chooses not to submit a thesis will submit instead at least two substantial papers arising from course work for review by committee members, and meets with them to discuss his or her program in a final master's colloquium.

The program is open to holders of undergraduate degrees in any discipline who can demonstrate sufficient background in humanities to permit study at the graduate level. Admission is by regular application to the Graduate School. Students may enroll full time or part time (minimum of 3 units per term). Students considering entering the program may enroll in an appropriate graduate course or courses through the Office of Continuing Education, at the same time making their interests known to the Director of the Humanities Program.

Liberal Studies—The Master of Arts Program

Bonnie E. Erickson, Ph.D. (North Carolina at Chapel Hill), *Director*

This interdisciplinary program allows individuals with a variety of professional and personal educational interests the flexibility to pursue their interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students study primarily on a part-time basis and choose from an array of interdisciplinary courses developed specifically for this program. In addition to courses specifically designed for the Liberal Studies Program, students may select other graduate-level courses that fit their individual needs and interests.

Literature—The Ph.D. Program

Associate Professor James L. Rolleston, Ph.D. (Yale), *Chairman and Director of Graduate Studies*

Professors

Bernard I. Duffey, Ph.D. (Ohio State); Magnus J. Krynski, Ph.D. (Columbia); Francis Newton, Ph.D. (North Carolina at Chapel Hill); Clyde de Loache Ryals, Ph.D. (Pennsylvania); Phillip Stewart, Ph.D. (Yale); Marcel Tetel, Ph.D. (Wisconsin); Bruce W. Wardropper, Ph.D. (Pennsylvania); George W. Williams, Ph.D. (Virginia)

Associate Professors

Frank Borchardt, Ph.D. (Johns Hopkins); Peter Burian, Ph.D. (Princeton); Ernesto Caserta, Ph.D. (Harvard); A. Leigh DeNeef, Ph.D. (Pennsylvania State); Miguel Garci-Gómez, Ph.D. (Catholic Univ.); Linda Orr, Ph.D. (Yale); Gustavo F. Pérez, Ph.D. (Michigan); Jean-Jacques Thomas, Doctorat de 3e Cycle (Univ. of Paris)

The interdepartmental program leading to a Ph.D. in literature offers to qualified students the opportunity to develop individual course sequences combining a series of core courses with selected courses in one or more of the departments of national literatures. Students entering the program must present evidence of ability to read two languages other than English, modern or classical; students commanding only one foreign language will learn a second during the first year of graduate study. The two-year program of courses includes a tutorial requirement: at least three courses must be taken on a tutorial basis, so that the student can rapidly acquire both specific research skills and broad perspectives on questions of literary theory and methodology.

Students' programs will be structured in consultation with the Committee for the Ph.D. in Literature. This committee, drawn from several literature departments, directs the program and advises students at every stage. More information on the program is provided in the section on special programs in this bulletin; and a full descriptive brochure is available from Dr. James L. Rolleston, Department of Germanic Languages and Literature.

Courses of Instruction

- | | |
|---|--|
| 301. Introduction to the Graduate Study of Literature | 303. Special Topics in Structure, Genre, and Periodization |
| 302. Criticism and Literary Theory in the Twentieth Century | 304. Philology, Linguistics, and the Roots of Literature |

Marine Sciences—The University Program

Professor John Costlow, Ph.D. (Duke), *Director*
Associate Professor Joseph S. Ramus, Ph.D. (California at Berkeley), *Assistant Director for Academic Programs and Director of Graduate Student Affairs*

Professors

Richard T. Barber, Ph.D. (Stanford); John Gutknecht, Ph.D. (North Carolina at Chapel Hill); Orrin Pilkey,* Ph.D. (Florida State); Richard B. Searles,† Ph.D. (California at Berkeley)

Associate Professors

Richard B. Forward, Ph.D. (California at Santa Barbara); Thomas C. Johnson, Ph.D. (California at San Diego); David R. McClay,† Ph.D. (North Carolina at Chapel Hill); J. Bolling Sullivan, Ph.D. (Texas); John P. Sutherland, Ph.D. (California at Berkeley)

Professor Emeritus

Cazlyn Green Bookhout, Ph.D. (Duke)

Assistant Medical Research Professors

Celia Bonaventura, Ph.D. (Texas); Joseph Bonaventura, Ph.D. (Texas)

Graduate students from any and all academic disciplines are encouraged to take professional training at the Marine Laboratory. The program operates year-round, providing course work in the marine sciences, an active seminar program, and facilities supporting dissertation research. Resident graduate students represent the Departments of Biochemistry, Botany, Forestry and Environmental Studies, Geology, Physiology, and Zoology. Ordinarily, dissertation advisers are resident as well, although this need not be the case. The Marine Laboratory has available three full-time instructional assistantships and a number of summer instructional assistantships for graduate student support. In addition, tuition credits obtained from fellowship support may be applied to courses given both at the Marine Laboratory and the Durham campus.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the laboratory should be addressed to the Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Additional information and the application form are included in the *Bulletin of Duke University: Marine Laboratory*. The application for enrollment in summer courses at the laboratory should be accompanied by transcripts of undergraduate and graduate work. Applications should be received as early as possible. Graduate students

*In residence during spring only.

†In residence during summer only.

planning to enroll in courses or seminars offered during the fall or spring at the Marine Laboratory should notify the Admissions Office of the Marine Laboratory of such intent *prior* to the beginning of the respective semester.

Students registering for research should do so under the appropriate departmental numbers.

The following courses are offered at Beaufort. See the Marine Laboratory bulletin for the current schedule of courses.

Courses of Instruction

Summer Program at Beaufort

203L. Marine Ecology
215L. Primary Productivity in the Seas
218. Barrier Island Ecology
219L. Benthic Marine Algae
250L. Physiology of Marine Animals
263L. Tropical Seaweeds
274L. Marine Invertebrate Zoology
276. Comparative and Evolutionary Biochemistry
278L. Invertebrate Developmental Biology
295S. Behavior and Ecology of Fishes
353, 354. Research
359, 360. Research

Fall Program at Beaufort

209. Independent Study
245L. Macromolecules, Ecology, and Evolution
———. Seminar

Spring Program at Beaufort

203. Physical Oceanography
204. Chemical Oceanography
205S. Geological Oceanography
210. Independent Study
220L. Adaptations of Organisms to the Marine Environment
———. Seminar

Courses Currently Unscheduled

247L. Plant Ecology

Mathematics

Professor Michael C. Reed, Ph.D. (Stanford), *Chairman*

Associate Professor Lawrence C. Moore, Jr., Ph.D. (California Inst. of Tech.), *Director of Graduate Studies*

Professors

William K. Allard, Ph.D. (Brown); J. Thomas Beale, Ph.D. (Stanford); Ronald J. DiPerna, Ph.D. (New York Univ.); Phillip A. Griffiths, Ph.D. (Princeton); David G. Schaeffer, Ph.D. (Massachusetts Inst. of Tech.); Joseph R. Schoenfeld, Ph.D. (Michigan); Seth L. Warner, Ph.D. (Harvard); Morris Weisfeld, Ph.D. (Yale)

Associate Professors

Donald S. Burdick, Ph.D. (Princeton); Richard E. Hodel, Ph.D. (Duke); Joseph W. Kitchen, Jr., Ph.D. (Harvard); David P. Kraines, Ph.D. (California at Berkeley); Gregory F. Lawler, Ph.D. (Princeton); William L. Pardon, Ph.D. (Princeton); Maria E. Schonbek, Ph.D. (Michigan); Richard A. Scoville, Ph.D. (Yale); David A. Smith, Ph.D. (Yale)

Assistant Professors

Margaret Cheney, Ph.D. (Indiana); Michael J. Miksis, Ph.D. (New York); Dana W. Nance, Ph.D. (Princeton); Chadmark L. Schoen, Ph.D. (Chicago); Michael Shearer, D.Phil. (Univ. of Oxford); John Sylvester, Ph.D. (Courant Inst. of Math. Sci.)

Adjunct Professors

Leon Bernstein, Ph.D. (State Univ. of Vilnius); Jagdish Chandra, Ph.D. (Rensselaer)

Lecturer

Leah Edelstein, Ph.D. (Weizmann Inst. of Science, Rehovot, Israel)

Graduate work in the Department of Mathematics is offered leading to the M.S., A.M., and Ph.D. degrees. Admission to these programs is based on the applicant's

undergraduate academic record, level of preparation for graduate study, the Graduate Record Examination, and letters of recommendation.

All A.M. and Ph.D. candidates are required to pass a qualifying examination after completing their first year of graduate study. The A.M. degree with a major in mathematics is awarded upon completion of 30 units of graded course work and passing the qualifying examination. A thesis may be substituted for 6 units of course work only under special circumstances. The department also offers a program in applied statistics with a minor in computer science leading to the M.S. degree.

Candidacy for the Ph.D. is established by passing the qualifying examination at the Ph.D. level, completing the department's language requirements, and passing an oral preliminary examination. The preliminary examination is normally taken at the beginning of the third year. The preliminary examination is conducted by a committee selected by the rules of the Graduate School and the department. The examination can, at the student's option, consist of questions based either on the student's course work at Duke or on the specific area of research plus a minor subject selected by the student.

After admission to candidacy, the Ph.D. degree is awarded on the basis of the student's scholarly ability as demonstrated by the dissertation and its defense. The dissertation is the most important requirement in the award of the Ph.D. degree.

Courses of Instruction

- 200. Introduction to Algebraic Structures I
- 201. Introduction to Algebraic Structures II
- 203. Basic Analysis I
- 204. Basic Analysis II
- 205. Topology
- 206. Differential Geometry
- 221, 222. Numerical Analysis I, II
- 230. Mathematical Methods in Physics and Engineering I
- 231. Mathematical Methods in Physics and Engineering II
- 234. Mathematics for Quantum Mechanics
- 238, 239. Topics in Applied Mathematics
- 240. Applied Stochastic Processes
- 241. Linear Models
- 242. Multivariate Statistics
- 248, 249. Topics in Statistics
- 250. Introductory Mathematical Logic
- 251. Set Theory I
- 252. Set Theory II
- 258, 259. Topics in Logic
- 260. Groups, Rings, Modules
- 261. Commutative Algebra
- 268, 269. Topics in Algebra

- 271. Algebraic Topology
- 278, 279. Topics in Topology
- 280. Differential Analysis
- 281. Real Analysis I
- 282. Real Analysis II
- 283. Linear Operators
- 284. Topics in Functional Analysis
- 285. Complex Analysis
- 286. Topics in Complex Analysis
- 288, 289. Topics in Analysis
- 290. Probability
- 293, 294. Topics in Probability Theory
- 297. Fourier Analysis and Distribution Theory
- 298. Partial Differential Equations I
- 299. Partial Differential Equations II
- 388, 389. Current Research in Analysis

Courses Currently Unscheduled

- 235. Topics in Mathematical Physics
- 358-359. Current Research in Logic
- 368-369. Current Research in Algebra
- 378-379. Current Research in Topology
- 387. Current Research in Mathematical Physics

Program in Medieval and Renaissance Studies

Professor Marcel Tetel, Ph.D. (Wisconsin), *Chairman and Director of Graduate Studies*

The graduate Program in Medieval and Renaissance Studies is an interdisciplinary program administered by the Duke University Center for Medieval and Renaissance Studies. In consultation with the Director of Graduate Studies, students in the program select courses in art, history, music, philosophy, religion, language, and literature (classical studies, English, German, and Romance languages). The program is described in the section on special programs; for a description of individual courses see the large *Bulletin of Duke University: Graduate School*.

Courses of Instruction

Department of Art and Art History

- 230S. Medieval and Byzantine Art and Architecture
- 232S. Romanesque and Gothic Art and Architecture
- 240. Italian Art
- 242S. Studies in Italian Renaissance Art
- 243S. Studies in Northern Art

Department of Classical Studies

- 221. Medieval Latin
- 312. Proseminar in Latin Paleography

Department of English

- 208. History of the English Language
- 212. Middle English Literature: 1100 to 1500
- 221. Renaissance Prose and Poetry: 1500 to 1660
- 225. Renaissance Drama: 1500 to 1642
- 312. Studies in Middle English Literature
- 315. Studies in Chaucer
- 321. Studies in Renaissance Literature
- 324. Studies in Shakespeare
- 329. Studies in Milton
- 383. Textual Criticism

Department of Germanic Languages and Literature

- 205, 206. Middle High German
- 215S. Seventeenth-Century Literature
- 216. History of the German Language
- 217S. Renaissance and Reformation Literature

Department of History

- 221. Problems in the Economic and Social History of Europe, 1200-1700
- 222. History of the Renaissance
- 237S. Europe in the Early Middle Ages
- 238S. Europe in the High Middle Ages
- 267S-268S. From Medieval to Early Modern England

Department of Music

- 201. Introduction to Musicology
- 211. Medieval Notation
- 212. Renaissance Notation
- 221. Music in the Middle Ages: Monophony
- 222. Music in the Middle Ages: Polyphony
- 223. Music in the Renaissance
- 312S. Seminar in Renaissance Music
- 351S. Studies in Musical Iconography

Department of Philosophy

- 218S. Medieval Philosophy
- 219S. Late Medieval and Renaissance Philosophy

Department of Religion

- 219. Augustine
- 236. Luther and the Reformation in Germany
- 241. Problems in Reformation Theology
- 334. Theology and Reform in the Later Middle Ages
- 337. Theology of St. Thomas Aquinas
- 338. Calvin and the Reformed Tradition
- 339. The Radical Reformation

Department of Romance Languages

French

- 211. History of the French Language
- 248. French Literature of the Seventeenth Century
- 325. French Prose of the Sixteenth Century
- 326. Topics in Renaissance Poetry
- 391, 392. French Seminar (medieval and Renaissance topics)

Italian

- 284, 285. Dante

Spanish

- 210. History of the Spanish Language
- 251. The Origins of Spanish Prose Fiction
- 253. Cervantes
- 254. Drama of the Golden Age
- 258. Spanish Lyric Poetry before 1700
- 391, 392. Hispanic Seminar (medieval and Renaissance topics)

Courses Currently Unscheduled

- Classical Studies 327. Seminar in Byzantine History
- English 210. Old English Literary Tradition
- English 310. Studies in Old English Literature
- English 380. Studies in Ballad and Folksong
- Music 311S. Seminar in Medieval Music
- Religion 206. Christian Mysticism in the Middle Ages
- Religion 251. The Counter-Reformation and the Development of Catholic Dogma
- Religion 344. Zwingli and the Origins of Reformed Theology

Microbiology and Immunology

Professor Wolfgang Karl Joklik, D.Phil. (Univ. of Oxford), *James B. Duke Professor of Microbiology and Immunology and Chairman*

Professor Hilda Pope Willett, Ph.D. (Duke), *Director of Graduate Studies*

Professors

D. Bernard Amos, M.D. (Guys Hospital, London), *James B. Duke Professor of Immunology*; Dani P. Bolognesi, Ph.D. (Duke); Rebecca Buckley, M.D. (North Carolina at Chapel Hill); Eugene D. Day, Ph.D. (Delaware); Richard S. Metzgar, Ph.D. (Buffalo); Suydam Osterhout, M.D. (Duke), Ph.D. (Rockefeller Inst.); Wendell F. Rosse, M.D. (Chicago); Hilliard F. Seigler, M.D. (North Carolina at Chapel Hill); Ralph

Snyderman, M.D. (SUNY, Downstate Med. Ctr.); Frances E. Ward, Ph.D. (Brown); Robert W. Wheat, Ph.D. (Washington)

Associate Professors

Deepak Bastia, Ph.D. (Chicago); Ronald B. Corley, Ph.D. (Duke); Peter Cresswell, Ph.D. (Univ. of London); Jeffrey R. Dawson, Ph.D. (Case Western Reserve); Sharyn Endow, Ph.D. (Yale); Jack D. Keene, Ph.D. (Washington at Seattle); Elwood A. Linney, Ph.D. (California at San Diego); Thomas G. Mitchell, Ph.D. (Tulane); Harvey J. Sage, Ph.D. (Yale)

Assistant Professors

Dolph O. Adams, M.D., Ph.D. (North Carolina at Chapel Hill); Yair Argon, Ph.D. (Harvard Medical School); C. Edward Buckley III, M.D. (Duke); Barton F. Haynes, M.D. (Baylor); Kenneth L. Kreuzer, Ph.D. (Chicago); David R. McClay, Ph.D. (North Carolina at Chapel Hill); Michael C. Ostrowski, Ph.D. (South Carolina at Columbia); David S. Pisetsky, M.D., Ph.D. (Albert Einstein)

Associate Medical Research Professor

Sara E. Miller, Ph.D. (Georgia)

Assistant Medical Research Professors

Mary Vickers Burdett, Ph.D. (Georgetown); W. David Sedwick, Ph.D. (Pennsylvania)

The department offers graduate work leading to the Ph.D. degree. Specialization is possible in molecular virology, viral oncology, cell biology, tumor biology, molecular microbiology, molecular genetics, immunochemistry, immunogenetics, cancer immunology, general immunology, and medical mycology.

Undergraduate preparation in the biological and physical sciences and in biochemistry is required. A brochure describing the Ph.D. degree program, prerequisites for admission, and research in the department can be obtained by writing the Director of Graduate Studies, Box 3020, Duke University Medical Center, Durham, North Carolina 27710.

Courses of Instruction

214. Fundamentals of Electron Microscopy
219. Molecular and Cellular Bases of Differentiation
221. Medical Microbiology
234. Introduction to Biostatistical Methods
236. Statistical Methods in Human Genetics
238. Intermediate Biostatistics and Data Analysis
244. Principles of Immunology
246S. Parasitic Diseases
252. General Virology and Viral Oncology
259. Molecular Biology I: Protein and Membrane Structure/Function
268. Molecular Biology II: Nucleic Acids
269. Advanced Cell Biology
291. Comprehensive Immunology

296. Contemporary Molecular Immunology
323. Topics in Cell and Molecular Biology
325. Medical Mycology
330. Medical Immunology
331.1-331.8. Microbiology Seminar
332.1-332.8. Immunology Seminar
336. Contemporary Topics in Immunogenetics

Courses Currently Unscheduled

219S. Seminar
242. Mechanisms of Microbial Pathogenicity
282. Molecular Microbiology
420. Cellular Immunophysiology

Music

Professor Fenner Douglass, M.Mus. (Oberlin), *Chairman*

Associate Professor R. Larry Todd, Ph.D. (Yale), *Director of Graduate Studies*

Professor

Robert E. Ward, B.Mus. (Eastman School of Music), *Visiting Mary Duke Biddle Professor of Music*

Associate Professor

Tilman Seebass, Ph.D. (Univ. of Basel)

Assistant Professors

V. Kofi Agawu, Ph.D. (Stanford); Elizabeth C. Bartlet, Ph.D. (Chicago); Stephen Jaffe, A.M. (Pennsylvania)

The Department of Music offers graduate work leading to the A.M. and Ph.D. degrees in musicology and the A.M. degree in composition. For the musicology program, applications are invited from students completing undergraduate curricula in music, as well as from qualified students in related disciplines. Nondegree students and especially graduate students from other departments may be admitted to graduate courses by consent of the instructor, according to their preparation. Students may be admitted to the Program in Medieval and Renaissance Studies (see the section on special programs in this bulletin).

A reading knowledge of one foreign language is required at admission; two are required for the A.M. (including German), and three for the Ph.D. (usually including German and Latin). Students are strongly urged to acquire as much language facility as possible before beginning graduate study.

For the composition program, the department invites applications from student composers who are completing or have completed their undergraduate work. A reading knowledge of one foreign language is required.

A detailed description of the requirements for the A.M. and Ph.D. is available upon request from the Director of Graduate Studies. The student should refer also to the description of general requirements of the University found in the section on other requirements in this bulletin.

Courses of Instruction

- 201. Introduction to Musicology
- 211. Medieval Notation
- 212. Renaissance Notation
- 213. Theories and Notation of Contemporary Music
- 215, 216. Problems in Music Analysis
- 221. Music in the Middle Ages: Monophony
- 222. Music in the Middle Ages: Polyphony
- 223. Music in the Renaissance
- 224. Music in the Baroque Era
- 225. Music in the Classic Era
- 226. Music in the Romantic Era
- 227. Music in the Postromantic and Modern Eras
- 290. Independent Study

- 296S. Analysis of Recent Contemporary Music
- 297, 298, 299. Composition
- 312S. Seminar in Renaissance Music
- 315S. Seminar in Nineteenth- and Twentieth-Century Music
- 341S. Problems in Music Theory
- 351S. Studies in Musical Iconography

Courses Currently Unscheduled

- 311S. Seminar in Medieval Music
- 313S. Seminar in Baroque Music
- 314S. Seminar in the Classic Period
- 382S. Studies in Ethnomusicology
- 392S. Interdisciplinary Colloquium

Generally topics of the seminars will be announced one semester in advance. Among the offerings may be: The Place of Music in Carolingian Culture; Theory and Practice of *Musica Ficta*; Monteverdi and his Time; The Classic Lied; The Music of Mendelssohn; Programmatic and Absolute Music in the Nineteenth Century; Elements of Musical Acculturation in Bali and Lombok (Indonesia); and French Organ Music.

The University Program in Neurobiology

Professor Irving Diamond, Ph.D. (Chicago), *Director*

Professors

Robert Erickson, Ph.D. (Brown); William C. Hall, Ph.D. (Duke); George G. Somjen, M.D. (Univ. of New Zealand); Thomas C. Vanaman, Ph.D. (Duke)

Associate Professors

Doyle G. Graham, M.D., Ph.D. (Duke); Bernard Kaufman, Ph.D. (Indiana)

Assistant Professor

J. Victor Nadler, Ph.D. (Yale)

Recent advances in neurobiology have resulted in new methods, such as immunohistochemistry, and in closer ties among the various approaches to studying the

nervous system. For example, research on the neuroanatomical basis of behavior is more dependent than ever before on the chemical and cellular study of neurons. To keep pace with these changes the program in neurobiology has been designed for a small number of students who wish to study the nervous system at several levels, ranging from the molecular to the behavioral. In planning course work, each student will be guided by an advisory committee whose members come from a variety of departments. All students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Each student must affiliate with one of the participating departments—anatomy, biochemistry, microbiology and immunology, pathology, pharmacology, physiology, psychology, and zoology—and must meet all the requirements of that department for the Ph.D. degree. Normally, the dissertation adviser and the student will be members of the same department. A complete list of faculty, including research interests, will be made available to prospective students. *See course listings under the participating departments.*

Pathology

Professor Robert B. Jennings, M.D. (Northwestern), *James B. Duke Professor of Pathology and Chairman*
Professor Darell D. Bigner, M.D., Ph.D. (Duke), *Director of Graduate Studies*

Professors

Dolph O. Adams, M.D., Ph.D. (North Carolina at Chapel Hill); Edward H. Bossen, M.D. (Duke); William D. Bradford, M.D. (Western Reserve); Bernard F. Fetter, M.D. (Duke); Donald B. Hackel, M.D. (Harvard); William W. Johnston, M.D. (Duke); Gordon K. Klintworth, M.D., Ph.D. (Univ. of Witwatersrand); John A. Koepke, M.D. (Wisconsin at Madison); Philip Pratt, M.D. (Johns Hopkins); Joachim R. Sommer, M.D. (Munich); F. Stephen Vogel, M.D. (Western Reserve); Benjamin Wittels, M.D. (Minnesota)

Associate Professors

Sandra H. Bigner, M.D. (Tennessee); Peter C. Burger, M.D. (Northwestern); Jane G. Elchlepp, M.D. (Iowa), Ph.D. (Chicago); Doyle G. Graham, M.D., Ph.D. (Duke); Kenneth Scott McCarty, Jr., M.D., Ph.D. (Duke); George Michalopoulos, M.D., Ph.D. (Wisconsin); Salvatore V. Pizzo, M.D., Ph.D. (Duke); Keith Arnold Reimer, M.D., Ph.D. (Northwestern); Alfred P. Sanfilippo, M.D., Ph.D. (Duke); John D. Shelburne, M.D., Ph.D. (Duke); Peter Zwadyk, Jr., Ph.D. (Iowa)

Assistant Professors

John Lloyd Abernethy, Ph.D. (Duke); Randy L. Jirtle, Ph.D. (Wisconsin); Stanley C. Schold, Jr., M.D. (Arizona)

Adjunct Associate Professor

James A. Swenberg, D.V.M. (Minnesota), Ph.D. (Ohio State)

Adjunct Assistant Professor

Arnold R. Brody, Ph.D. (Colorado State)

Assistant Clinical Professor

Robin T. Vollmer, M.D. (Duke)

Assistant Medical Research Professor

Carol J. Wikstrand, Ph.D. (North Carolina at Chapel Hill)

The Department of Pathology offers graduate work leading to the M.S. and Ph.D. degrees with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of modern research techniques. Students will be required to take such courses as are necessary to obtain a broad foundation, as well as courses applicable to areas of speciality and research. Further information including brochures

giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

Courses of Instruction

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|---|---|
| 219. Molecular and Cellular Bases of Differentiation | 367. Special Topics in Pathology |
| 250. General Pathology | 369. Ophthalmic Pathology |
| 251. Laboratory Course in General Pathology | 370. Developmental Pathology and Teratology |
| 258. Cellular and Subcellular Pathology | 374. Pulmonary Pathology and Postmortem Pathophysiology |
| 275. Fundamentals of Electron Microscopy and Biological Microanalysis | 377. Pathology of the Kidney |
| 325. Cardiovascular Pathology | 380. Diagnostic Immunology |
| 353. Advanced Neuropathology | 381. Cancer Biology |
| 355. Graduate Seminar in Pathology | 382. General Pathology for Toxicologists |
| 357. Research in Pathology | |
| 361, 362. Autopsy Pathology | |
| 364. Systemic Pathology | |

Courses Currently Unscheduled

360. Cytochemistry

Pharmacology

Professor Norman Kirshner, Ph.D. (Pennsylvania State), *Chairman*
Professor Elliott Mills, Ph.D. (Columbia), *Director of Graduate Studies*

Professors

Mohamed Bahie Abou-Donia, Ph.D. (California at Berkeley); Everett H. Ellinwood, Jr., M.D. (North Carolina at Chapel Hill); Leon Lack, Ph.D. (Columbia); Daniel B. Menzel, Ph.D. (California at Berkeley); Athos Ottolenghi, M.D. (Univ. of Pavia); Saul M. Schanberg, M.D., Ph.D. (Yale); Theodore A. Slotkin, Ph.D. (Rochester); Pelham Wilder, Jr., Ph.D. (Harvard)

Associate Professors

Thorir D. Bjornsson, M.D. (Univ. of Iceland); James N. Davis, M.D. (Cornell); Cynthia Moreton Kuhn, Ph.D. (Duke); J. Victor Nadler, Ph.D. (Yale); Gerald M. Rosen, Ph.D. (Clarkson Coll. of Tech.); Harold C. Strauss, M.D. (McGill)

Assistant Professors

James O. McNamara, M.D. (Michigan); Stephen C. Strom, Ph.D. (Kansas); A. Richard Whorton, Ph.D. (Vanderbilt)

Professor Emeritus

Frederick Bernheim, Ph.D. (Univ. of Cambridge), *James B. Duke Professor Emeritus of Pharmacology*

Adjunct Professors

Pedro Cuatrecasas, M.D. (Washington Univ., St. Louis); Charles A. Nichol, Ph.D. (Wisconsin)

Adjunct Associate Professor

Oswaldo Humberto Viveros, M.D. (Univ. of Chile)

Medical Research Professor

Gertrude B. Elion, D.M.Sc. (Brown)

Associate Medical Research Professor

Wilkie A. Wilson, Jr., Ph.D. (Duke)

Assistant Medical Research Professors

Jorge V. Bartolome, Ph.D. (Chile); Peter G. Smith, Ph.D. (Duke); Steven P. Wilson, Ph.D. (Duke)

The Department of Pharmacology offers a graduate program which leads to the Ph.D. degree. Training is available in the areas of behavioral, biochemical, cardiovascular, developmental and endocrine pharmacology, neuropharmacology, and toxicology. Because pharmacology is an interdisciplinary field, the department gives serious

consideration to applicants with strong undergraduate backgrounds in biological, chemical, and neural or behavioral sciences. There is no foreign language requirement.

Courses of Instruction

200. Pharmacology: Mode Action of Drugs
210, 211. Individual Study and Research
219. Tutorial in Pharmacology
256. Human Nutrition
280. Student Seminar in Pharmacology
302. Introduction to Biostatistical Methods
314. Integrated Case Studies in Toxicology
330. Pharmacological Basis of Clinical Medicine
331. Laboratory Methods in Pharmacology
333. Principles of Pharmacology and Toxicology I
334. Principles of Pharmacology and Toxicology II

347, 348. Seminar in Toxicology
354. Mammalian Toxicology
360. Neuropharmacology
364. Neurotoxicology
370. Neurobiology I
372. Research in Pharmacology
417. Cellular Endocrinology

Courses Currently Unscheduled

260S. Interactions of Differentiated Cells
301. Physical Chemistry of Aqueous Solutions

Philosophy

Professor David H. Sanford, Ph.D. (Cornell), *Acting Chairman*
Associate Professor Carl J. Posy, Ph.D. (Yale), *Director of Graduate Studies*

Professors

Martin P. Golding, Ph.D. (Columbia); Edward P. Mahoney, Ph.D. (Columbia); William Bernard Peach, Ph.D. (Harvard)

Associate Professors

Robert N. Brandon, Ph.D. (Harvard), *Andrew W. Mellon Associate Professor of Philosophy*; George W. Roberts, Ph.D. (Cambridge)

Assistant Professors

Michael T. Ferejohn, Ph.D. (California at Irvine); Kathryn N. Jackson, Ph.D. (Toronto); Marshall R. Roderick, Ph.D. (Texas at Austin)

Professor Emeritus

Paul Welsh, Ph.D. (Cornell)

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may, after taking a balanced program, specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophy of mind, philosophical analysis, ethics, aesthetics, political philosophy, philosophy of law, philosophy of medicine, and philosophy of religion.

Individual programs of study are developed for each student. The following requirement, however, is fundamental: the preliminary examination for the Ph.D., which may be taken only after a student has met the language requirement for that degree, should be taken after the second year of study. In these examinations students are expected to combine historical knowledge with critical understanding.

Work in a minor or related field, not necessarily confined to any one department, is encouraged but not required. A minor normally includes 6 units for the A.M. or the Ph.D. degree and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School may earn the A.M. degree in philosophy by passing an oral master's examination. This examination, which can be the defense of either a master's thesis or an alternative academic exercise approved by the department and the student's committee, is normally given in the student's fourth term of full-time registration. The examination can be given earlier in two special circumstances:

1. A student with a strong undergraduate background in philosophy who satisfies the department of his or her qualifications by submitting several samples of written work before beginning the program may be admitted to the master's program with the understanding that the master's examination can be given in the second or third term of full-time registration.

2. A student who combines the A.M. program in philosophy with another advanced degree program, such as the programs for the J.D., the M.D., or the Ph.D. in another field, will register as a full-time graduate student of philosophy for only two terms, the minimum registration that meets the general requirements of the Graduate School for the A.M. degree. These two terms of full-time registration need not be consecutive, and their position in the student's overall program is determined in individual cases. A student in a combined program will normally do some work in philosophy while registered in the student's primary program and do some work in the primary field while registered in philosophy. The master's examination can be given in the second term of full-time registration as a philosophy graduate student or in a later term when the student is registered in the primary program.

A student in the philosophy Ph.D. program who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing the preliminary for the Ph.D. degree.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. Students may not take their preliminary examinations until they have demonstrated this ability. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

Courses of Instruction

203S. Contemporary Ethical Theories
204S. Philosophy of Law
205S. Philosophy of History
206S. Responsibility
208S. Political Values
211S. Plato
217S. Aristotle
218S. Medieval Philosophy
219S. Late Medieval and Renaissance Philosophy
225S. British Empiricism
227S. Continental Rationalism
228S. Recent and Contemporary Philosophy
230S. The Meaning of Religious Language
231S. Kant's Critique of Pure Reason

233S. Methodology of the Empirical Sciences
234S. Problems in the Philosophy of Science
235S. Hegel and Marx
251S. Epistemology
252S. Metaphysics
253S. Philosophy of Mind
254S. Philosophy of Religion
291S, 292S. Special Fields of Philosophy
311. Philosophy and Medicine
331, 332. Seminar in Special Fields of Philosophy

Courses Currently Unscheduled

202S. Aesthetics: The Philosophy of Art
232S. Recent Continental Philosophy

Physical Therapy

Professor Robert C. Bartlett, M.A. (New York Univ.), *Chairman*
Associate Professor Eleanor F. Branch, Ph.D. (Duke), *Director of Graduate Studies*

Associate Professor

Elia E. Villanueva, A.M. (Duke)

Assistant Professors

Pamela W. Duncan, M.A.C.T. (North Carolina at Chapel Hill); Grace C. Horton, M.S. (Duke)

Assistant Clinical Professors

Elaine M. Eckel, M.A. (North Carolina at Chapel Hill); Mary Ellen Riordan, M.S. (Wisconsin)

The Department of Physical Therapy offers an entry level professional program leading to the M.S. degree. To be eligible for admission to the program, applicants

must have obtained a baccalaureate degree and have a background in the basic sciences and social sciences, including course work in biology, chemistry, physics, and psychology.

The program is designed to provide for integration of classroom knowledge and clinical learning experiences essential for the competent practice of physical therapy. In view of this integrated curriculum, failure in a major course within a semester would prevent the student from continuing in the program. Major courses are all courses offered by the Department of Physical Therapy as well as required courses offered by the Department of Anatomy. A grade of *F* (or *noncredit* in the case of Physical Therapy 342, 343, and 344) in any of these courses will occasion withdrawal from the program. Program requirements also include a comprehensive examination, at the completion of the curriculum, and a research project. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3965, Duke University Medical Center, Durham, North Carolina 27710.

Courses of Instruction

- 210. Independent Study
- 301. Introduction to Scientific Inquiry
- 302. Research
- 303. Research
- 304. Seminar in Applied Neurophysiology
- 313. Physical Agents
- 317. Kinesiology
- 318. Arthrology and Pathokinesiology
- 319. Introduction to Evaluation and Patient Care
- 320. Evaluation and Therapeutic Procedures I
- 321. Evaluation and Therapeutic Procedures II
- 322. Evaluation and Therapeutic Procedures III
- 332. Physical Therapy and Health Services:
Administration and Issues

- 334. Introductory Pathology
- 336. Medical Sciences
- 340. Special Topics in Physical Therapy
- 342. Directed Clinical Experience in Physical Therapy I
- 343. Directed Clinical Experience in Physical Therapy II
- 344. Directed Clinical Experience in Physical Therapy III

Courses Currently Unscheduled

- 324. Prosthetics and Orthotics

Physics

Professor Harold W. Lewis, Ph.D. (Duke), *University Distinguished Service Professor of Physics and Chairman*
Professor Henry A. Fairbank, Ph.D., (Yale), *Director of Graduate Studies*

Professors

L. C. Biedenharn, Jr., Ph.D. (Massachusetts Inst. of Tech.); Edward G. Bilpuch, Ph.D. (North Carolina at Chapel Hill); Ron Y. Cusson, Ph.D. (California Inst. of Tech.); Frank C. De Lucia, Ph.D. (Duke); Lawrence E. Evans, Ph.D. (Johns Hopkins); Alfred T. Goshaw, Ph.D. (Wisconsin); Moo-Young Han, Ph.D. (Rochester); Eric Herbst, Ph.D. (Harvard); Johannes Horst Max Meyer, Ph.D. (Univ. of Geneva); N. Russell Roberson, Ph.D. (Johns Hopkins); Hugh G. Robinson, Ph.D. (Duke); William D. Walker, Ph.D., (Cornell); Richard L. Walter, Ph.D. (Notre Dame); Henry R. Weller, Ph.D. (Duke)

Associate Professors

Lloyd R. Fortney, Ph.D. (Wisconsin); Richard G. Palmer, Ph.D. (Cambridge)

Assistant Professors

Robert P. Behringer, Ph.D. (Duke); Seog Hwan Oh, Ph.D. (Massachusetts Inst. of Tech.)

Adjunct Professors

Fearghus O'Foghludha, Ph.D. (National Univ. of Ireland); Herman R. Robl, Ph.D. (Univ. of Vienna); Katherine Way, Ph.D. (North Carolina at Chapel Hill)

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields in which research is being done by faculty and staff.

With the help of faculty advisers, students select a course program to fit their needs, including work in a related field, usually mathematics or chemistry. Students are encouraged to begin research work early in their careers.

Courses of Instruction

- 211. Modern Physics
- 214. Introduction to Solid-State Physics
- 215. Introduction to Quantum Mechanics
- 217S, 218S. Advanced Physics Laboratory and Seminar
- 220. Electronics
- 240. Computer Applications to Physical Measurement
- 302. Advanced Mechanics
- 303. Statistical Mechanics
- 304. Advanced Topics in Statistical Mechanics*
- 305. Introduction to Nuclear Physics
- 308. Introduction to High-Energy Physics
- 309. Solid-State Physics I
- 316. Principles of Quantum Theory
- 317. Intermediate Quantum Theory
- 318. Electromagnetic Field Theory

- 331. Quantum Electronics*
- 335. Molecular Spectroscopy
- 342. Theory of Elementary Particles*
- 346. Topics in Theoretical Physics*

Courses Currently Unscheduled

- 306. Low Temperature Physics
- 310. Solid-State Physics II
- 312. Phase Transitions and Critical Phenomena
- 330. Nuclear Structure Theory
- 341. Advanced Topics in Quantum Theory
- 343. Nuclear Physics
- 344. Advanced Nuclear Physics
- 345. High-Energy Physics
- 351, 352. Seminar
- 397, 398. Low Temperature and Solid-State Seminar

Physiology

Professor Edward A. Johnson, M.D. (Univ. of Sheffield), *James B. Duke Professor of Physiology and Chairman*
Associate Professor Thomas J. McManus, M.D. (Boston), *Director of Graduate Studies*

Professors

J. J. Blum, Ph.D. (Chicago), *James B. Duke Professor of Physiology*; Irving T. Diamond, Ph.D. (Chicago); John W. Gutknecht, Ph.D. (North Carolina at Chapel Hill); Frans E. Jöbsis, Ph.D. (Michigan); Peter K. Lauf, M.D. (Univ. of Freiburg); Melvyn Lieberman, Ph.D. (SUNY, Downstate Med. Center); Lazaro J. Mandel, Ph.D. (Pennsylvania); John W. Moore, Ph.D. (Virginia); Jacqueline A. Reynolds, Ph.D. (Washington); George G. Somjen, M.D. (Univ. of New Zealand); Madison S. Spach, M.D. (Duke); Charles Tanford, Ph.D. (Princeton), *James B. Duke Professor of Physiology*

Associate Professors

Nels C. Anderson, Ph.D. (Purdue); Peter B. Bennett, Ph.D. (Univ. of Southampton); Robert F. Erickson, Ph.D. (Brown); Joseph C. Greenfield, M.D. (Emory); J. Mailen Kootsey, Ph.D. (Brown); Johannes A. Kylstra, M.D., Ph.D. (Univ. of Leiden); Elliott Mills, Ph.D. (Columbia); George M. Padilla, Ph.D. (California at Los Angeles); David W. Schomberg, Ph.D. (Purdue); Sidney A. Simon, Ph.D. (Northwestern); Myron L. Wolbarsht, Ph.D. (Johns Hopkins)

Assistant Professors

Page A. W. Anderson, M.D. (Duke); Enrico Mario Camporesi, M.D. (Univ. of Milan); Marc Caron, Ph.D. (Univ. of Miami); Vincent W. Dennis, M.D. (Georgetown); Stuart Handwerker, M.D. (Maryland); Andrew G. Wallace, M.D. (Duke); Andrew S. Wechsler, M.D. (SUNY, Downstate Med. Ctr.); William E. Yarger, M.D. (Baylor)

Adjunct Assistant Professors

Reginald D. Carter, Ph.D. (Bowman Gray); Philip A. McHale, Ph.D. (Duke)

Associate Medical Research Professor

Avis L. Sylvia, Ph.D. (North Carolina at Chapel Hill)

Assistant Medical Research Professors

Gilbert Baumann, Dr.Sc. (Swiss Federal Inst. of Tech.); Michael Lee Hines, Ph.D. (Chicago)

The Department of Physiology offers graduate work leading to the Ph.D. degree. Before undertaking this program a student should have a strong background in basic

*Offered on demand.

sciences including course work in mathematics, biology, physics, and chemistry through physical chemistry. Undergraduates with this background may have majors in any of the following areas: biology, chemistry, physics, mathematics, engineering, or computer sciences. There is no foreign language requirement.

Courses of Instruction

200. Medical Physiology
 201. Basic Neurophysiology
 204. Introduction to Modern Physiology
 208. Respiratory System in Health and Disease
 210. Individual Study
 217. Membrane Transport
 219S. Seminar in Membrane Physiology
 230. Molecular and Cellular Bases of Differentiation
 272S. Physiology of the Central Nervous System
 280. Student Seminar in Physiology
 320. Gastrointestinal Physiology
 321. Renal Physiology
 370. Neurobiology I
 372. Research in Physiology
 390. Membrane Biology
 401. Metabolic Physiology
 417. Cellular Endocrinology

418. Reproductive Biology
 424. Seminar in Reproductive Biology

Courses Currently Unscheduled

203. Introduction to Biophysics and Biophysical Chemistry
 207. The Heart in Health and Disease
 281. Teaching in Physiology
 301. Oxygen and Physiological Function
 302. Advanced Topics and Research Seminar in Smooth and Striated Muscle
 362. Cardiac Muscle Physiology
 383. Physiological Instrumentation
 416. Biophysics of Excitable Membranes
 419. Topics in Mathematical Physiology
 420. Cellular Immunophysiology

Political Science

Professor Allan Kornberg, Ph.D. (Michigan), *Chairman*

Associate Professor Peter Lange, Ph.D. (Massachusetts Inst. of Tech.), *Director of Graduate Studies*

Professors

William Louis Ascher, Ph.D. (Yale); James D. Barber, Ph.D. (Yale), *James B. Duke Professor of Political Science*; Ralph Braibanti, Ph.D. (Syracuse), *James B. Duke Professor of Political Science*; Peter G. Fish, Ph.D. (Johns Hopkins); Hugh M. Hall, Jr., Ph.D. (Texas); Ole R. Holsti, Ph.D. (Stanford), *George V. Allen Professor of Political Science*; Donald L. Horowitz, LL.M., Ph.D. (Harvard); Jerry F. Hough, Ph.D. (Harvard); Richard H. Leach, Ph.D. (Princeton); David L. Paletz, Ph.D. (California at Los Angeles); David E. Price, B.D., Ph.D. (Yale); Thomas A. Spragens, Jr., Ph.D. (Duke); Arturo Valenzuela, Ph.D. (Columbia)

Associate Professors

Albert Eldridge, Ph.D. (Kentucky); Sheridan Johns III, Ph.D. (Harvard); Margaret A. McKean, Ph.D. (California at Berkeley)

Assistant Professors

Robert M. Entman, Ph.D. (Yale); Michael A. Gillespie, Ph.D. (Chicago); Joseph M. Grieco, Ph.D. (Cornell); John F. Hoadley, Ph.D. (North Carolina at Chapel Hill); Herbert P. Kitschelt, Ph.D. (Bielefeld, West Germany); Timothy J. Lomperis, Ph.D. (Duke); Darryl Lamont Roberts, Ph.D. (Cornell)

Adjunct Associate Professor

Jean F. O'Barr, Ph.D. (Northwestern)

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant must have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science. Instruction is currently offered in the following fields: American government and politics, comparative government and politics, political theory, and international relations.

The candidate for the degree of Doctor of Philosophy in political science must take at least sixteen courses in all, including twelve in the department, and demonstrate competence in at least two general fields of the discipline as well as in a third general field or in a specialized subfield or in a field external to the department. The candidate must also demonstrate a reading knowledge of two foreign languages or must demonstrate proficiency in one foreign language and in the use of statistics.

The terminal degree of Master of Arts, for those who do not intend to continue with doctoral studies, is awarded following successful completion of: (1) eight one-semester courses of 3 units each, at least half of which must be in political science; and (2) the A.M. thesis. In addition, candidates for the A.M. degree must demonstrate competence in one foreign language or in statistics.

Further details on the graduate program in political science, the departmental facilities, the staff, and available financial aid may be obtained from the Director of Graduate Studies, Department of Political Science.

Courses of Instruction

- 201S. Problems in International Security
- 203S. Politics and the Media of Mass Communication
- 204S. Ethics in Political Life
- 207S. American Constitutional Interpretation
- 208S. Analyzing the News
- 209. Problems in State Government and Politics
- 211S. Current Problems and Issues in Japanese Politics
- 212S. Domestic Structures and Foreign Policies of Advanced Democratic States
- 213S. Theories of International Political Economy
- 214S. The Politics of Scarcity
- 218S, 219S. Political Thought in the United States
- 220S. Problems in International Politics
- 223. Ancient Political Philosophy
- 224S. Modern Political Theory
- 225. Topics in Comparative Government and Politics: Western Europe
- 226S. Theories of International Relations
- 227. International Law
- 228S. Nineteenth- and Twentieth-Century Political Philosophy
- 229S. Contemporary Theory of Liberal Democracy
- 232. Political Economy: Theory and Applications to Western Europe
- 233S. Quantitative Political Analysis II
- 234S. Political Economy of Development: Theories of Change in the Third World
- 235S. Comparative Development of Islam
- 236. Statistical Analysis
- 237S. Comparative Public Policy
- 240. American Political Behavior
- 242S. Comparative Law and Policy: Ethnic Group Relations
- 245. Ethics and Policy Making
- 248. The Politics of the Policy Process
- 249. Comparative International Development and Technology Flow
- 251S. The American Presidency
- 253S. Comparative Government and the Study of Latin America
- 255. Political Sociology
- 256S. Arms Control and National Security Policy
- 259S. Low Intensity Conflict and the Lessons of Viet Nam
- 260. The Tradition of Political Inquiry
- 261. Politics and the Future
- 262S. International Communism
- 263S. Methods of Political Science
- 264. The President and the Federal Bureaucracy
- 267S. Policy Making in International Organizations
- 275. The American Party System
- 277. Comparative Party Politics
- 282S. Canada
- 283S. Congressional Policy Making
- 284S. Public Policy Process in Developing Countries
- 286S. Judicial Administration
- 293. Federalism
- 303. Seminar on Statistics
- 305. Seminar in U.S. Foreign Policy
- 308. Individual Research
- 309. Seminar in International Relations
- 321. Seminar in Political Theory
- 325. Seminar in Comparative Government and Politics
- 326. Research Seminar in Comparative Government and Politics
- 340. Seminar in American Politics and Institutions
- 381. Research Seminar in Latin American Government and Politics

Courses Currently Unscheduled

- 280S. Comparative Government and Politics: Sub-Saharan Africa
- 360. Seminar in Government and Politics in the Soviet Union

Related Course Work in the School of Law

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to in the larger Graduate School bulletin (see the section on academic regulations in the chapter "Registration and Regulations" in that bulletin).

Psychology

Professor Robert C. Carson, Ph.D. (Northwestern), *Chairman*

Professor Carl J. Erickson, Ph.D. (Rutgers), *Director of Graduate Studies*

Professors

Irving E. Alexander, Ph.D. (Princeton); William Bevan, Ph.D. (Duke), *William Preston Few Professor of Psychology*; Lloyd J. Borstelmann, Ph.D. (California at Berkeley); John D. Coie, Ph.D. (California at Berkeley); Philip R. Costanzo, Ph.D. (Florida); Irving T. Diamond, Ph.D. (Chicago), *James B. Duke Professor of Psychology*; Robert P. Erickson, Ph.D. (Brown); Warren G. Hall, Ph.D. (Johns Hopkins); Martin Lakin, Ph.D. (Chicago); Gregory R. Lockhead, Ph.D. (Johns Hopkins); Harold Schiffman, Ph.D. (Princeton); John E. R. Staddon, Ph.D. (Harvard); Michael A. Wallach, Ph.D. (Harvard); Cliff W. Wing, Jr., Ph.D. (Tulane)

Associate Professors

John H. Casseday, Ph.D. (Indiana); Ruth S. Day, Ph.D. (Stanford); Carol O. Eckerman, Ph.D. (Columbia); William C. Hall, Ph.D. (Duke); John B. McConahay, Ph.D. (California at Los Angeles); Susan Roth, Ph.D. (Northwestern); David C. Rubin, Ph.D. (Harvard)

Assistant Professors

Theodore H. Dix, Ph.D. (Northwestern); Irwin Kremen, Ph.D. (Harvard); Martha Putallaz, Ph.D. (Illinois)

Professor Emeritus

Gregory A. Kimble, Ph.D. (Iowa)

Adjunct Professors

H. Keith H. Brodie, M.D. (Columbia); David P. Campbell, Ph.D. (Minnesota); Herbert F. Crovitz, Ph.D. (Duke)

Lecturers

Kenneth E. Clark, Ph.D. (Ohio State); Charles N. Cofer, Ph.D. (Brown); Ralph L. Cooper, Ph.D. (Rutgers); Steven H. Herman, Ph.D. (Duke); Francis J. Keefe, Ph.D. (Ohio Univ.); Andrew P. King, Ph.D. (Cornell); John E. Lochman, Ph.D. (Connecticut); Patrick E. Logue, Ph.D. (North Dakota); Gail R. Marsh, Ph.D. (Iowa); Ellis B. Page, Ed.D. (California at Los Angeles); John W. Payne, Ph.D. (California at Irvine); Robert N. Sawyer, Ed.D. (Wyoming); Susan S. Schiffman, Ph.D. (Duke); Robert H. Shipley, Ph.D. (Michigan State); George G. Somjen, M.D. (New Zealand); Richard S. Surwit, Ph.D. (McGill); Robert J. Thompson, Jr., Ph.D. (North Dakota); Lise Wallach, Ph.D. (Kansas); Redford B. Williams, Jr., M.D. (Yale); Myron L. Wolbarsht, Ph.D. (Johns Hopkins)

The department offers graduate work leading to the Ph.D. degree. The areas of concentration are experimental, biological, cognitive, personality, developmental, and clinical. A brochure is available from the Director of Graduate Studies which describes the program in more detail and gives information on financial assistance, facilities, and current research activities.

Courses of Instruction

202S. Great Ideas in Psychology
203S. Sensation and Perception
210S. Cognition
212S. Human Memory
214S. Development of Social Interaction
215S. Cognitive Development
216S. Biological Psychology
217S. Social Psychology
219S. Neural Bases of Behavior
220S. Psycholinguistics
230S. Social Behavior of Animals
234S. Personality
238S. Electroencephalogram and Psychological Function

245S. Personality Theory
266. Comparative Neurobiology
271S. A-F Selected Problems
272S. Physiology of the Central Nervous System
273S, 274S. Statistical Principles in Experimental Design
286S. Biological Basis of Hearing
301. Group Psychotherapy and Processes
305. Psychopathology
307. Introduction to Methods in Psychotherapy
309. Seminar in Learning
310. Seminar in Perception
318. Measurement and Methods

319-320. Research Apprenticeship I
 323, 324. Seminar in Community Psychology
 331-332. Research Apprenticeship II
 335-336. Clinical Inquiry I
 337. Seminar in Sensory Discrimination
 343-344. Clinical Inquiry II
 348. Psychotherapy with Children and Families
 349-350. Practicum in Psychological Research
 351. Developmental Psychopathology
 352. Child Assessment

353. Research Practicum in Prevention
 398. Graded Research
 399. Special Readings in Psychology

Courses Currently Unscheduled

325. Seminar in Animal Behavior
 329-330. Proseminar in Psychology
 334. Seminar: Behavioral Studies of the Brain
 338. Pictorial Representation and Iconic Communication

Public Policy Studies

Associate Professor Robert D. Behn, Ph.D. (Harvard), *Director*

Professor Philip J. Cook, Ph.D. (California at Berkeley), *Associate Director*

Assistant Professor Michael I. Luger, Ph.D. (California at Berkeley), *Director of Graduate Studies*
Director of Internship Programs and Placement Services

Professors

William Louis Ascher, Ph.D. (Yale); James D. Barber, Ph.D. (Yale); Charles T. Clotfelter, Ph.D. (Harvard); David M. Eddy, M.D. (Virginia), Ph.D. (Stanford); Joel L. Fleishman, LL.M. (Yale); S. Malcolm Gillis, Ph.D. (Illinois); Donald L. Horowitz, LL.M., Ph.D. (Harvard); Jerry F. Hough, Ph.D. (Harvard); David L. Lange, LL.B. (Illinois); George W. Pearsall, Sc.D. (Massachusetts Inst. of Tech.); David E. Price, Ph.D. (Yale); W. Kip Viscusi, Ph.D. (Harvard)

Associate Professors

Patricia Danzon, Ph.D. (Chicago); Bruce R. Kuniholm, Ph.D. (Duke); Joseph Lipscomb, Jr., Ph.D. (Vanderbilt); Wesley A. Magat, Ph.D. (Northwestern); John B. McConahay, Ph.D. (California at Los Angeles); Carol B. Stack, Ph.D. (Illinois); James W. Vaupel, Ph.D. (Harvard)

Assistant Professors

Robert M. Entman, Ph.D. (Yale); Sudhir Shetty, Ph.D. (Cornell)

Professors of the Practice

Henry Geller, J.D. (Northwestern); Richard A. Stubbing, M.B.A. (Harvard), Ph.B. (Notre Dame); Duncan Yaggy, Ph.D. (Brandeis)

Lecturer

Bruce L. Payne, M.A. (Yale)

The graduate program in public policy studies is offered through the Institute of Policy Sciences and Public Affairs. The objective of the program is to prepare students for jobs, particularly in the public sector, which require analytical skills and a practical understanding of the processes by which policy is made and implemented.

The A.M. degree requires two academic years and a summer internship. The first year is devoted to core courses in policy analysis, including sequences in quantitative methods, economics, political analysis, and ethics. The summer internship is arranged with a federal, state, or local agency. The second-year curriculum includes course work in public management and macroeconomics, a concentration in a substantive policy area, and a masters "memo" to be researched and written on a problem of current policy concern.

Students who are concurrently enrolled in a Ph.D. program or a professional degree program (M.D., J.D., M.B.A., M.H.A., etc.) or who have already obtained such a degree, can apply for an abbreviated version of the A.M. program. Such students are excused from most second-year requirements, so ordinarily the A.M. in public policy can be completed in one additional year. Students usually apply for a joint degree program simultaneously with their applications to the graduate departments or professional schools, or during their first or second year of advanced study.

The institute does not award a Ph.D.

More information concerning the A.M. programs can be obtained by writing the Director of Graduate Studies.

Courses of Instruction

- 204S. Ethics in Political Life
215S. Public Policies to Save Lives
217. Microeconomics and Public Policy Making
218. Macroeconomic Policy
219. The Politics of the Policy Process
221. Analytical Methods I: Decision Analysis for Public Policy Makers
222. Analytical Methods II: Data Analysis for Public Policy Makers
223. Ethics and Policy Making
231. Analytical Methods III: Quantitative Policy Evaluation
232. Analytical Methods IV: Topics in Economic Policy
236S, 237S. Public Management I and II: Managing Public Agencies
238S. Public Budgeting and Financial Management
240S. Analyzing the News
241. Reporting the American People
242S. Comparative Law and Policy: Ethnic Group Relations
245S. Leadership Tutorial
250. Public Policy and the Arts
254. Transportation Planning and Policy Analysis
257. United States Policy in the Middle East
264S. Research Seminar: Topics in Public Policy I
267S. Policy Making in International Organizations
268. Federal Tax Policy
270S. Humanistic Perspectives on Public Policy
272. Resource Economics and Policy
278. Human Service Bureaucracies
283S. Congressional Policy Making
284S. Public Policy Process in Developing Countries
286S. Economic Policy Making in Developing Countries
290. Glasgow Seminar in Public Policy
303. Public Policy Workshop I
304.01. Public Policy Workshop II
305.01. Public Policy Workshop III
387. Research Tutorial in Public Policy
388. Research Tutorial in Public Policy
399. Special Readings in Public Policy Studies

Courses Currently Unscheduled

256. The Economics of Health Care

Religion

Associate Professor Kalman P. Bland, Ph.D. (Brandeis), *Chairman*
Professor Eric M. Meyers, Ph.D. (Harvard), *Director of Graduate Studies*

Professors

William W. Beach, Ph.D. (Yale); David G. Bradley, Ph.D. (Yale); Dennis M. Campbell, Ph.D. (Duke); Elizabeth A. Clark, Ph.D. (Columbia); Stanley Hauerwas, Ph.D. (Yale); Frederick Herzog, Th.D. (Princeton); Wesley A. Kort, Ph.D. (Chicago); Creighton Lacy, Ph.D. (Yale); Thomas A. Langford, Ph.D. (Duke); Bruce B. Lawrence, Ph.D. (Yale); C. Eric Lincoln, Ph.D. (Boston); Charles H. Long, Ph.D. (Chicago); Roland E. Murphy, S.T.D. (Catholic Univ. of America), *George Washington Ivey Professor of Old Testament*; Robert T. Osborn, Ph.D. (Drew); William H. Poteat, Ph.D. (Duke); D. Moody Smith, Ph.D. (Yale); Harmon L. Smith, Ph.D. (Duke); David C. Steinmetz, Th.D. (Harvard); Dan O. Via, Jr., Ph.D. (Duke); Geoffrey Wainwright, Dr. Théol. (Geneva); Orval S. Wintermute, Ph.D. (Johns Hopkins)

Associate Professors

Lloyd R. Bailey, Ph.D. (Hebrew Union Coll., Jerusalem); Roger J. Corless, Ph.D. (Wisconsin); Robert C. Gregg, Ph.D. (Pennsylvania); Carol L. Meyers, Ph.D. (Brandeis); Harry B. Partin, Ph.D. (Chicago); Melvin K. H. Peters, Ph.D. (Toronto)

Assistant Professor

Sandra P. Robinson, Ph.D. (Chicago)

Professor Emeritus

Stuart C. Henry, Ph.D. (Duke)

Adjunct Professor

Jack Murad Sasson, Ph.D. (Brandeis)

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of seven fields: (1) Old Testament and Semitic studies, (2) New Testament and Christian origins, (3) history of Christianity, (4) Christian theology and ethics, (5) history of Judaism, (6) history of religions, and (7) religion

and culture. They will be expected to take courses which will contribute to an adequate understanding of their chosen fields of specialization and will be required to take two written preliminary examinations within their field of concentration.

In addition to course work in their major field, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies and will be required to take one written preliminary examination in a single cognate area within the department. A minor requirement may be fulfilled by work in a cognate department, such as classical studies, history, philosophy, political science, or sociology, and will constitute the outside minor and material for a fourth written preliminary examination. There is, in addition, an oral examination conducted by the student's committee immediately subsequent to the written examinations.

The program of doctoral studies presumes a foundation in the academic study of religion. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only upon the satisfactory completion of the A.M. degree with the department.

The graduate program also offers an A.M. degree that is not linked to a specific Ph.D. field. Such study is intended to encourage individuals to pursue a variety of interests irrespective of whether they desire further graduate study. An A.M. concentration may be in any of the seven Ph.D. fields or in an individually designed program of study (such as Islamic studies or religion and the social sciences).

Courses of Instruction

204. Origen
- 207, 208. Intermediate Biblical Hebrew
209. Old Testament Theology
210. Contemporary British Theology
213. Christian Ethics in America
- 215S. Theological Ethics
217. Islam in India
218. Religion in Japan
219. Augustine
220. Rabbinic Hebrew
221. Readings in Hebrew Biblical Commentaries
- 223A-G. Exegesis of the Hebrew Old Testament
225. Living Issues in New Testament Theology
- 226A-F. Exegesis of the Greek New Testament I
- 227A-D. Exegesis of the Greek New Testament II
228. Twentieth-Century Continental Theology
- 230S. The Meaning of Religious Language
- 231S. Seminar in Religion and Contemporary Thought
- 232S. Religion and Literature
233. Modern Narratives and Religious Meanings
234. Early Christian Asceticism
235. Heresy: Theological and Social Dimensions of Early Christian Dissent
236. Luther and the Reformation in Germany
237. History of the Ancient Near East
238. Jewish Responses to Christianity
239. Introduction to Middle Egyptian I
240. Introduction to Middle Egyptian II
241. Problems in Reformation Theology
243. Archaeology of Palestine in Biblical Times
244. The Archaeology of Palestine in Hellenistic-Roman Times
245. Ethics in World Religions
246. Problems in Historical Theology
248. The Theology of Karl Barth
249. The Lord's Prayer
256. John Wesley in Controversial and Ecumenical Theology
257. New Testament Ethics
258. Coptic
262. Marxist Ideology and Christian Faith
264. The Sociology of the Black Church
265. The Religions of the West Africa Diaspora
279. Understandings of the Resurrection in Contemporary Thought
280. The History of Religions
281. Phenomenology and Religion
282. Myth and Ritual
283. Islam and Modernism
284. The Religion and History of Islam
285. Introduction to the History of Religions
287. The Scriptures of Asia
288. Buddhist Thought and Practice
289. Theology and Contemporary Secular Understandings of Human Nature
290. Current Problems in Christian Social Ethics
291. Historical Forms of Protestant Ethics
292. Happiness, Virtue, and Friendship
294. Christianity and the State
296. Religion on the American Frontier
300. Systematic Theology: The Doctrine of the Trinity
302. Studies in the Intertestamental Literature
304. Aramaic
305. The Septuagint
306. Language and Literature of the Dead Sea Scrolls
307. Syriac
308. Greek Patristic Texts
309. Hermeneutics
310. Readings in Judaica
318. Seminar in the Greek Fathers
320. Theology, Power, and Justice

322. Nineteenth-Century European Theology
 323A. Comparative Semitic I
 323B. Comparative Semitic II
 324. Readings in the History of Religion
 325. Philosophical Theology I
 326. Philosophical Theology II
 329. Readings in Theology and Language
 330. Contemporary Christologies
 331. Eschatology
 334. Theology and Reform in the Later Middle Ages
 337. Theology of St. Thomas Aquinas
 338. Calvin and the Reformed Tradition
 340-341. Seminar in the New Testament
 343. Readings in Ancient Near Eastern Wisdom Literature
 350-351. Old Testament Seminar
 352. Seminar in Christian Theology
 353. Seminar on Text Criticism
 360. Special Problems in Religion and Culture
 362. Readings in Old Testament and Semitic Studies
 363. Readings in New Testament and Christian Origins
 364. Readings in History of Christianity
 365. Readings in Christian Theology and Ethics
 366. Readings in History of Religions
 367. Readings in Religion and Culture
 373-374. Elementary Akkadian
 377. Contemporary American Dramatic Arts and Evolving Theological Forms
 380. Existentialist Thought
 383. Moral Theology in the Twentieth Century
 384. Religious Dissent in American Culture
 385. Religion in American Literature

386. Christianity in Dialogue with Other Faiths
 387. Ethical Method
 389. Christian Ethics and Contemporary Culture
 395. Christian Thought in Colonial America
 396. Liberal Traditions in American Theology

Courses Currently Unscheduled

206. Christian Mysticism in the Middle Ages
 242. Life after Death in Semitic Thought
 247. Readings in Latin Theological Literature
 251. Counter-Reformation and Development of Catholic Dogma
 252. Nineteenth- and Twentieth-Century Roman Catholic Theology
 301. Seminar in Contemporary Christian Ethics
 304A. Targumic Aramaic
 311. Pharisaic Judaism in the First Century
 312. Pauline Theology
 313. The Apostolic Fathers
 314. Judaism and Christianity in the New Testament
 315-316. Seminar: History of Religions
 317. Seminar in the Greek Apologists
 319. The Gospel According to St. Matthew in Recent Research
 327. Philosophical Method in Religious Studies
 328. Twentieth-Century European Theology
 335. The English Church in the Eighteenth Century
 339. The Radical Reformation
 344. Zwingli and the Origins of Reformed Theology
 388. Ethics and Medicine
 397. Contemporary American Theology
 398. Colloquium on the Teaching of Religion
 401. Colloquium in Biblical Studies

Romance Languages

Professor Phillip Stewart, Ph.D. (Yale), *Chairman*

Associate Professor Jean-Jacques Thomas, Doctorat de 3e Cycle (Univ. of Paris), *Director of Graduate Studies*

Professors

Thomas H. Cordle, Ph.D. (Yale); John M. Fein, Ph.D. (Harvard); Rafael Osuna, Ph.D. (Brown); Marcel Tetel, Ph.D. (Wisconsin); Bruce W. Wardropper, Ph.D. (Pennsylvania), *William H. Wannamaker Professor of Romance Languages*

Associate Professors

Ernesto Caserta, Ph.D. (Harvard); Miguel Garci-Gómez, Ph.D. (Catholic Univ.); Alexander Hull, Ph.D. (Washington); Linda Orr, Ph.D. (Yale); Gustavo F. Pérez, Ph.D. (Michigan)

Assistant Professor

David F. Bell III, Ph.D. (Johns Hopkins)

The Department of Romance Languages offers graduate work leading to the A.M. and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. Related work for the A.M. and Ph.D. degrees is required in a second Romance language or in any one or two of a number of other subject areas.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

French

Courses of Instruction

- 210. The Structure of French
- 211. History of the French Language
- 223. Semiotics for Literature
- 248. French Literature of the Seventeenth Century
- 251, 252. Literature of the Eighteenth Century
- 256. Modern Literature and History
- 257, 258. The Nineteenth-Century French Novel
- 261. French Symbolism
- 263. Contemporary French Theater
- 265, 266. French Literature of the Twentieth Century
- 290S. Studies in a Contemporary Figure
- 325. French Prose of the Sixteenth Century
- 326. Topics in Renaissance Poetry
- 391, 392. French Seminar
- Graduate Reading Course

Courses Currently Unscheduled

- 255. French Preromantic and Romantic Poetry

Italian

Courses of Instruction

- 283. Italian Novel of the Novecento
- 284. Dante
- 285. Dante

Slavic Languages and Literatures

Professor Magnus J. Krynski, Ph.D. (Columbia), *Chairman*

Associate Professor Emeritus

Bronislas de Leval Jezierski, Ph.D. (Harvard)

The Department of Slavic Languages and Literatures offers graduate courses in Russian language and literature and limited training in the language and literature of Poland.

Students should have sufficient preparation in the Russian language to enable them to read Russian classical literature in the original. Any presently unscheduled course will be taught in any semester upon request.

Courses of Instruction

- 201, 202. Russian Novel of the Nineteenth Century
- 225. Tolstoy
- 232. Dostoevsky

Spanish

Courses of Instruction

- 210. History of the Spanish Language
- 241. Colonial Prose of Spanish America
- 245. Modern Spanish-American Poetry
- 246. Modern Spanish-American Fiction
- 248. Studies in Spanish-American Literature
- 251. The Origins of Spanish Prose Fiction
- 253. Cervantes
- 254. Drama of the Golden Age
- 258S. Spanish Lyric Poetry before 1700
- 262. The Romantic Movement
- 275. Modern Spanish Poetry
- 276. Modern Spanish Drama
- 277. Modern Spanish Novel
- 391, 392. Hispanic Seminar

Romance Languages

Courses of Instruction

- 218. The Teaching of Romance Languages
- 310. Computers for the Humanities

Courses Currently Unscheduled

- 230. Chekhov

Sociology

Professor Alan C. Kerckhoff, Ph.D. (Wisconsin), *Chairman*

Professor Joel Smith, Ph.D. (Northwestern), *Director of Graduate Studies*

Professors

Kurt W. Back, Ph.D. (Massachusetts Inst. of Tech.), *James B. Duke Professor of Sociology*; George L. Maddox, Jr., Ph.D. (Michigan State); George C. Myers, Ph.D. (Washington); Erdman B. Palmore, Ph.D. (Columbia); Jack J. Preiss, Ph.D. (Michigan State); Ida H. Simpson, Ph.D. (North Carolina at Chapel Hill); Edward A. Tiryakian, Ph.D. (Harvard)

Associate Professors

Richard T. Campbell, Ph.D. (Wisconsin); Linda K. George, Ph.D. (Duke); John Wilson, D.Phil. (Univ. of Oxford)

Assistant Professors

Gary Gereffi, Ph.D. (Yale); Angela O’Rand, Ph.D. (Temple); Kenneth I. Spenner, Ph.D. (Wisconsin); David C. Stark, Ph.D. (Harvard)

Research Associate Professor

Kenneth G. Manton, Ph.D. (Duke)

The department offers graduate work leading to the A.M. and Ph.D. degrees in sociology. Students beginning work toward an advanced degree should have completed a minimum of 12 semester hours of acceptable courses in sociology and an additional 12 semester hours in related work (e.g., other social sciences, statistics, computer science, philosophy, mathematics). Accepted applicants who have not had such preparation may be required to take work beyond the usual requirements. Applicants for admission are required to take the verbal and quantitative aptitude tests of the Graduate Record Examination.

The department concentrates its Ph.D. training in two programs: life course analysis, and changing world societies. Each program has its own two-core-course requirement, as well as a common six-course requirement covering theory (280, 281), methodology and research methods (296, 297), and statistics (293, 294). In addition, each program has an informal seminar series and expects student involvement in related research activities. In order to assure some breadth of training, all students also are required to take one of the core courses of the program in which they are not concentrating and at least four other departmental courses beyond those listed above. Two additional courses outside the department in related work are also required, for a total of fifteen courses beyond the bachelor’s degree.

There is a qualifying procedure after three semesters, or equivalent, to determine whether the student can proceed to the preliminary examination which consists of two four-hour written examinations and a two-hour oral examination covering the core curriculum and the program area chosen by the student. Further details concerning the general departmental program, the specialized programs, departmental facilities, the staff, ongoing research, and various stipends available may be obtained from the Director of Graduate Studies.

Courses of Instruction

- 201S. Social Change
- 203. Comparative Aspects of Societal Transformation
- 204. The Dynamics of Global Interdependence
- 234S. Political Economy of Development: Theories of Change in the Third World
- 241. Social Stratification
- 243. Population Dynamics and Social Change
- 244. Human Ecology and Urban Systems
- 255. Political Sociology
- 276S. Social Structure and the Life Course
- 277S. Social Patterns of Personal Development
- 279S. Social Psychology
- 280S. Contemporary Sociological Theory
- 281S. Development of Sociological Theory
- 282S. Canada
- 293. Introductory Statistical Analysis
- 294. Intermediate Statistical Analysis
- 296S. Research Methods and Methodology

- 297S. Data Collection and Analysis
- 298S, 299S. Seminar in Selected Topics

Courses Currently Unscheduled

- 233S. Culture, Religion, and Modernity
- 301. Seminar in Human Fertility
- 302. Seminar in Migration
- 325. Social Aspects of Mental Illness and Treatment
- 345, 346. Demographic Techniques I and II
- 349, 350. Seminar in Selected Topics of Demography and Ecology
- 373, 374. Social Psychological Issues in Sociology
- 385. Seminar in Sociological Theory
- 386. Seminar in Sociological Theory
- 390. Seminar in Field Methods of Sociological Research
- 392. Individual Research in Sociology
- 397, 398. Seminar in Special Research

The University Program in Toxicology

Professor of Medicine William S. Lynn, Jr., M.D. (Columbia), *Director*

Professor Mohamed B. Abou-Donia, Ph.D. (California at Berkeley), *Deputy Director*

Associate Professor Doyle G. Graham, M.D., Ph.D. (Duke), *Deputy Director*

Associate Professor Curtis J. Richardson, Ph.D. (Tennessee), *Deputy Director*

The University Program in Toxicology seeks to produce individuals with sound training in the scientific basis for research in toxicology who will advance the science of this discipline. After broad general courses in epidemiology and statistics, pathology, and mammalian toxicology, students will be trained in one of three tracks: (1) as generalist toxicologists, with broad training in the principles and concepts of toxicology and the design of protocols for toxicological assessments; (2) as specialist toxicologists in those areas of toxicology research in which faculty members are currently productive in pulmonary toxicology, neurotoxicology, immunotoxicology, genetic toxicology (carcinogenesis), and biochemical toxicology; or (3) as ecotoxicologists with broad training in principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and the effects of toxics in the ecosystems.

The toxicology program faculty is comprised of members from the Departments of Anatomy, Biochemistry, Chemistry, Forestry and Environmental Studies, Microbiology and Immunology, Pathology, Pharmacology, Physiology, Zoology, and several departments in the School of Medicine.

Students seeking the Ph.D. in one of the participating Graduate School departments may make initial application to either the program or one of the departments. All who apply directly to the program will be considered for admission by the program and the department of the student's choice. Students who apply initially for graduate study in one of the departments may also be nominated by that department for admission to the program. It is expected that most students will have a strong undergraduate preparation in mathematics and the physical and biological sciences with demonstrated excellence of performance as judged by grades in course work and letters of recommendation from former instructors.

All students in the program will take a series of courses in toxicology as well as courses specified by his or her department. A student will be expected to choose a dissertation adviser in his or her department at least by the end of the first two semesters in the program, and will normally be expected to begin dissertation research during the third semester in residence. Upon satisfactorily completing all degree requirements in the program and in the department, students will be jointly recommended for the Ph.D. degree.

Further information may be obtained from the Director of the toxicology program (Department of Biochemistry).

Zoology

Professor R. Bruce Nicklas, Ph.D. (Columbia), *Chairman*

Professor Henry M. Wilbur, Ph.D. (Michigan), *Director of Graduate Studies*

Professors

Richard T. Barber, Ph.D. (Stanford); John D. Costlow, Jr., Ph.D. (Duke); Donald J. Fluke, Ph.D. (Yale); Nicholas W. Gillham, Ph.D. (Harvard); Peter H. Klopfer, Ph.D. (Yale); Daniel A. Livingstone, Ph.D. (Yale), *James B. Duke Professor of Zoology*; John E. R. Staddon, Ph.D. (Harvard); Vance A. Tucker, Ph.D. (California at Los Angeles); Steven Vogel, Ph.D. (Harvard); Stephen A. Wainwright, Ph.D. (California at Berkeley); Calvin L. Ward, Ph.D. (Texas)

Associate Professors

Richard B. Forward, Jr., Ph.D. (California at Santa Barbara); John G. Lundberg, Ph.D. (Michigan); David R. McClay, Ph.D. (North Carolina at Chapel Hill); H. Frederik Nijhout, Ph.D. (Harvard); Mark D. Rausher, Ph.D. (Cornell); John P. Sutherland, Ph.D. (California at Berkeley)

Assistant Professors

William E. Conner, Ph.D. (Cornell); Mary M. Nijhout, Ph.D. (Harvard); Virginia Louise Roth, Ph.D. (Yale); Marcy K. Uyenoyama, Ph.D. (Stanford)

Adjunct Professor

Klaus Schmidt-Koenig, Ph.D. (Univ. of Freiburg)

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking the Ph.D. degree. The A.M. degree may be taken by students en route to the Ph.D., or by those who leave the doctoral program. Ordinarily, only students seeking the doctorate are admitted to the department.

In general, students entering the department will be equipped to pursue advanced degrees if they have completed an undergraduate major in biology along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in both the *Bulletin of Duke University: Undergraduate Instruction* and the *Bulletin of Duke University: Graduate School* for information about the intellectual resources of the University. Special attention should be given to announcements of the Departments of Anatomy, Anthropology, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Pharmacology, Philosophy, Physiology, Psychology, Sociology, and Zoology; announcements of the Schools of Engineering and Forestry and Environmental Studies should also be consulted.

Courses of Instruction

- 201L. Animal Behavior
- 203L. Marine Ecology
- 204L. Community Ecology
- 215L. Primary Productivity in the Seas
- 216L. Limnology
- 222L. Entomology
- 226L. Ichthyology
- 233. Principles of Insect Behavior
- 237L. Systematic Biology
- 244. Principles of Immunology
- 247S. Photobiology
- 249. Biomechanics
- 250L. Physiology of Marine Animals
- 258L. Laboratory Research Methods
- 259L. Laboratory in Biomechanics
- 261. Biology of Parasitism

- 269. Advanced Cell Biology
- 274L. Marine Invertebrate Zoology
- 278L. Invertebrate Developmental Biology
- 280. Principles of Genetics
- 283. Extrachromosomal Inheritance
- 286. Evolutionary Mechanisms
- 287S. Macroevolution
- 288. Mathematical Population Genetics
- 293L. Population Biology
- 295S, 296S. Seminar
- 353, 354. Research
- 360, 361. Tutorials

Courses Currently Unscheduled

- 252. Comparative Physiology
- 355, 356. Seminar

Related Programs

Cell and Molecular Biology, The University Program. See announcement in this bulletin.

Genetics, The University Program. Genetics courses offered by the Department of Zoology are part of the University Program in Genetics; see announcement in this bulletin.

Marine Sciences, The University Program. Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Latin America. Refer to Organization for Tropical Studies in this bulletin in the section on special programs.

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bulletin of

Duke University 1985-86

Graduate School



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Duke University 1985-86

Graduate School

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The information in the bulletin applies to the academic year 1985-86 and is accurate and current, to the best of our knowledge, as of January, 1985. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, call Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111.

The *Bulletin of Duke University*, Volume 57, includes the following titles: *The Fuqua School of Business*; *The School of Forestry and Environmental Studies*; *Marine Laboratory*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *The Graduate School* (short form); *The School of Law*; and *Information and Regulations*.

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Calendar of the Graduate School*

Summer 1985†

March		
25	Monday	Beginning of registration for Term I and/or Term II.
April		
30	Tuesday	Beginning this day, summer drop/adds must be approved by the academic dean or Director of Graduate Studies.
May		
1	Wednesday	Last day for payment of Term I fees without \$25 late fee (before 4:30 P.M.).
9	Thursday	Term I classes begin.
13	Monday	Drop/add for Term I ends at 4:00 P.M.
June		
17	Monday	Last day for payment of Term II fees without \$25 late fee (before 4:30 P.M.).
21	Friday	Term I final examinations begin.
22	Saturday	Term I final examinations end.
25	Tuesday	Term II classes begin.
27	Thursday	Drop/add for Term II ends at 4:00 P.M.
August		
1	Thursday	Final date for filing with the Graduate School office the intention to receive an advanced degree in September.
7	Wednesday	Term II final examinations begin.
8	Thursday	Term II final examinations end.

Fall 1985

August		
19	Monday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Drop/add for graduate students who registered in March.
19	Monday	Consultations with Directors of Graduate Studies concerning course programs begin.
20	Tuesday, 9:00 A.M., 111 Biological Sciences Building	English examination for foreign students. (See the chapter "Admission" for section on additional procedures for foreign students.)
20-21	Tuesday-Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Registration of all new and nonregistered returning students in the Graduate School.
26	Monday, 8:00 A.M.	Fall semester classes begin.
27	Tuesday, 1:00-3:00 P.M., 127 Allen Building	Late registration.
27	Tuesday, 1:00-3:00 P.M., 127 Allen Building	Drop/add. Final date for changing registration with reduction in fees, except a change due to the passing of preliminary or final degree examinations.
28-30	Wednesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Drop/add continues.
September		
2	Monday, Labor Day	Classes are in session.
3-6	Tuesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Drop/add continues.
6	Friday	Final date for changes in registration which involve adding courses, provided no reduction in fees is entailed.
9-13	Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.
16-20	Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building	Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.

*The dates in this calendar are subject to change.

†The School of Forestry and Environmental Studies, the Fuqua School of Business, the Marine Laboratory, the Department of Health Administration, and the Department of Physical Therapy have different term lengths and/or starting dates during the summer; consult the appropriate bulletins and schedules.

20	Friday—Final date for dropping course/seminar registration and adding equivalent units of research.
20	Friday—Final date for changes in registration resulting from the passing of preliminary or final degree examinations.
October	
11	Friday, 6:00 P.M.—Fall break begins.
16	Wednesday, 8:00 A.M.—Classes resume.
November	
5-6	Tuesday-Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Registration for spring semester 1986.
22	Friday, 6:00 P.M.—Thanksgiving recess begins.
December	
2	Monday, 8:00 A.M.—Classes resume.
2	Monday—Final date for filing with the Graduate School office the intention to receive an advanced degree in December.
2	Monday, 6:00 P.M.—Fall semester classes end. ‡
3-9	Tuesday-Monday—Reading period. ‡
8	Sunday—Founders' Day.
10	Tuesday—Final examinations begin.
14	Saturday—Final examinations end.

Spring 1986

January	
6	Monday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add for graduate students who registered in November.
6	Monday, 2:00 P.M., 111 Biological Sciences Building—English examination for foreign students. (See the chapter "Admission" for section on additional procedures for foreign students.)
7	Tuesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Registration of all new and nonregistered returning students in the Graduate School.
8	Wednesday, 8:00 A.M.—Spring semester classes begin.
9	Thursday, 1:00-3:00 P.M., 127 Allen Building—Late registration.
9	Thursday, 1:00-3:00 P.M., 127 Allen Building—Drop/add. Final date for changing registration with reduction in fees except a change due to the passing of preliminary or final degree examinations.
10	Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues.
13-17	Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues.
20-22	Monday-Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues.
22	Wednesday—Final date for changes in registration which involve adding courses, provided no reduction in fees is entailed.
23-24	Thursday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.
27-30	Monday-Thursday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.
31	Friday—Final date for filing with the Graduate School office the intention to receive an advanced degree in May. Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.
February	
3-5	Monday-Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Drop/add continues for dropping course/seminar registration and adding equivalent units of research only.
5	Wednesday—Final date for dropping course/seminar registration and adding equivalent units of research.
5	Wednesday—Final date for changes in registration resulting from the passing of preliminary or final degree examinations.
28	Friday, 6:00 P.M.—Spring recess begins.

‡For 200-level courses, the length of the reading period is at the discretion of the instructor.

March	
10	Monday, 8:00 A.M.—Classes resume.
24-25	Monday-Tuesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., 127 Allen Building—Registration for fall semester 1986, and beginning of registration for summer 1986.
April	
1	Tuesday—Last day for submitting dissertations for Ph.D. and Ed.D. degrees.
1	Tuesday—Last day for submitting theses for master's degrees.
14	Monday, 6:00 P.M.—Spring semester classes end.‡
15-21	Tuesday-Monday—Reading period.‡
22	Tuesday—Final examinations begin.
26	Saturday—Final examinations end.
May	
3	Saturday—Commencement begins.
4	Sunday—Graduation exercises. Conferring of degrees.

University Administration

General Administration

H. Keith H. Brodie, M.D., *President*
 Phillip A. Griffiths, Ph.D., *Provost*
 William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
 Eugene J. McDonald, LL.M., *Senior Vice-President*
 William J. Griffith, A.B., *Vice-President for Student Affairs*
 John J. Piva, Jr., B.A., *Vice-President for Development and Alumni Affairs*
 William L. Green, Jr., A.B., *Vice-President for University Relations*
 Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
 J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
 Roger L. Marshall, A.B., *Secretary of the University*
 Andrew G. Wallace, M.D., *Vice-Chancellor for Health Affairs*
 Joel L. Fleishman, LL.M., *Vice-Chancellor*
 Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
 R. James Henderson, M. Ed., *Associate Vice-President and Business Manager*

Graduate School Administration

Craufurd D. Goodwin, Ph.D., *Dean of the Graduate School*
 A. Leigh DeNeef, Ph.D., *Associate Dean*
 Bonnie Erickson, Ph.D., *Assistant Dean*
 Donna Lee Giles, A.B., *Assistant Dean*
 Aleane G. Webb, A.B., *Assistant Dean*
 Louise W. Knight, M.A.T., *Coordinator, Office of Research Support*

Executive Committee of the Graduate Faculty

Dean Craufurd D. Goodwin
 J. Thomas Beale*
 Joel Colton*
 Jeffrey R. Dawson
 Carol O. Eckerman*
 Ann W. Epstein*
 Richard Fox
 Peter Lange
 Eric M. Meyers
 Montrose J. Moses*
 Robert Plonsey
 David H. Sanford
 Richard B. Searles
 Phillip Stewart*
 Richard L. Walter
 Richard L. Wells*
 Henry M. Wilbur*

‡For 200-level courses, the length of the reading period is at the discretion of the instructor.

*Term expires August 31, 1985.

Graduate School Faculty

(As of November 1, 1984.)

The date denotes the first year of service at Duke University.

John Lloyd Abernethy (1984), Ph.D., Assistant Professor of Pathology
Mohamed Bahie Abou-Donia (1975), Ph.D., Associate Professor of Pharmacology
Dolph O. Adams (1972), M.D., Ph.D., Professor of Pathology and Assistant Professor of Immunology
David B. Adcock (1983), J.D., Adjunct Assistant Professor of Health Administration
V. Kofi Agawv (1984), Ph.D., Assistant Professor of Music
Irving E. Alexander (1963), Ph.D., Professor of Psychology
William K. Allard (1975), Ph.D., Professor of Mathematics
A. Tilo Alt (1961-65; 1967), Ph.D., Associate Professor of Germanic Languages and Literature
D. Bernard Amos (1962), M.D., James B. Duke Professor of Immunology
Carl Anderson (1955), Ph.D., Professor of English
C. William Anderson (1978), Ph.D., Assistant Professor of Chemistry
Nels C. Anderson (1966), Ph.D., Associate Professor of Physiology
Page A. W. Anderson (1973), M.D., Assistant Professor of Physiology
Janis Antonovics (1970), Ph.D., Professor of Botany
Mahadev L. Apte (1965), Ph.D., Associate Professor of Anthropology
Yair Argon (1984), Ph.D., Assistant Professor of Immunology
Edward M. Arnett (1980), Ph.D., R. J. Reynolds Industries Professor of Chemistry
William Louis Ascher (1984), Ph.D., Professor of Public Policy Studies and Professor of Political Science
Kurt W. Back (1959), Ph.D., James B. Duke Professor of Sociology
Lloyd Richard Bailey (1971), Ph.D., Associate Professor of Old Testament
Paul A. Baker (1981), Ph.D., Assistant Professor of Geology
Steven W. Baldwin (1970), Ph.D., Associate Professor of Chemistry
Helmy Hamdollah Baligh (1967), Ph.D., Professor of Business Administration
Robert H. Ballantyne (1962), Ed.D., Associate Professor of Education
Bruce W. Ballard (1981), Ph.D., Associate Professor of Computer Science
James David Barber (1972), Ph.D., James B. Duke Professor of Political Science and Professor of Public Policy Studies
Richard T. Barber (1970), Ph.D., Professor of Zoology and Professor of Botany
Thomas Barnett-Robisheaux (1984), Ph.D., Assistant Professor of History
Roger C. Barr (1969), Ph.D., Professor of Biomedical Engineering
Elizabeth C. Bartlett (1982), Ph.D., Assistant Professor of Music
Robert Charles Bartlett (1976), M.A., Professor of Physical Therapy
Jorge Valls Bartolome (1978), Ph.D., Assistant Medical Research Professor of Pharmacology
Deepak Bastia (1979), Ph.D., Associate Professor of Microbiology
Joseph Battle (1970), Ph.D., Associate Professor of Business Administration
Gilbert Baumann (1976), Dr. Sc., Assistant Medical Research Professor of Physiology
William Waldo Beach (1946), Ph.D., Professor of Christian Ethics
J. Thomas Beale (1983), Ph.D., Professor of Mathematics
Hie Ping Beall (1975), Ph.D., Assistant Medical Research Professor of Anatomy
Robert D. Behn (1973), Ph.D., Associate Professor of Public Policy Studies
Robert Paul Behringer (1982), Ph.D., Assistant Professor of Physics
Adrian Bejan (1984), Ph.D., Professor of Mechanical Engineering and Materials Science
David F. Bell III (1983), Ph.D., Assistant Professor of Romance Languages
Robert M. Bell (1972), Ph.D., Professor of Biochemistry
Peter Brian Bennett (1972), Ph.D., Associate Professor of Physiology
Charles W. Bergquist (1972), Ph.D., Associate Professor of History
Leon Bernstein (1980), Ph.D., Adjunct Professor of Mathematics
James R. Bettman (1982), Ph.D., Burlington Industries Professor of Business Administration
William Bevan (1974), Ph.D., William Preston Few Professor of Psychology
L. C. Biedenharn, Jr. (1961), Ph.D., Professor of Physics
Alan Biermann (1974), Ph.D., Associate Professor of Computer Science
Darell D. Bigner (1972), M.D., Ph.D., Professor of Pathology
Sandra P. Bigner (1977), M.D., Associate Professor of Pathology
Edward George Bilpuch (1962), Ph.D., Professor of Physics
Daniel E. Binkley (1982), Ph.D., Assistant Professor of Forestry
Mrinmay Biswas (1983), Ph.D., Associate Professor of Civil Engineering
Thorir D. Bjornsson (1978), M.D., Associate Professor of Pharmacology
Kalman P. Bland (1973), Ph.D., Associate Professor of Religion
Sherman Bloomer (1983), Ph.D., Assistant Professor of Geology
J. J. Blum (1962), Ph.D., James B. Duke Professor of Physiology
Mary T. Boatwright (1979), Ph.D., Assistant Professor of Classical Studies

Dani P. Bolognesi (1971), Ph.D., *Professor of Virology*
 Celia Bonaventura (1972), Ph.D., *Assistant Medical Research Professor of Biochemistry*
 Joseph Bonaventura (1972), Ph.D., *Assistant Medical Research Professor of Biochemistry*
 Frank Borchardt (1971), Ph.D., *Associate Professor of Germanic Languages and Literature*
 Lloyd J. Borstelmann (1953), Ph.D., *Professor of Psychology*
 Edward H. Bossen (1972), M.D., *Professor of Pathology*
 Stephen G. Boyce (1981), Ph.D., *Adjunct Professor of Natural Resources*
 John E. Boynton (1968), Ph.D., *Professor of Botany*
 William D. Bradford (1966), M.D., *Professor of Pathology*
 David G. Bradley (1949), Ph.D., *Professor of Religion*
 Ralph Braibanti (1953), Ph.D., *James B. Duke Professor of Political Science*
 Eleanor F. Branch (1972), Ph.D., *Associate Professor of Physical Therapy*
 Robert N. Brandon (1979), Ph.D., *Andrew W. Mellon Associate Professor of Philosophy*
 Philip L. Brock (1982), Ph.D., *Assistant Professor of Economics*
 Arnold Ralph Brody (1978), Ph.D., *Adjunct Assistant Professor of Pathology*
 Samuel C. Brown (1983), M.E.A., *Adjunct Assistant Professor of Health Administration*
 Caroline A. Bruzelius (1981), Ph.D., *Andrew W. Mellon Assistant Professor of Art*
 James D. Bryers (1984), Ph.D., *Associate Professor of Civil and Environmental Engineering*
 C. Edward Buckley III (1963), M.D., *Assistant Professor of Microbiology and Immunology*
 Rebecca Buckley (1968), M.D., *Professor of Immunology*
 Louis J. Budd (1952), Ph.D., *James B. Duke Professor of English*
 M. Vickers Burdett (1977), Ph.D., *Assistant Medical Research Professor of Microbiology*
 Donald S. Burdick (1962), Ph.D., *Associate Professor of Mathematics and Associate Professor of Biomedical Engineering*
¹Peter C. Burger (1973), M.D., *Associate Professor of Pathology*
 Peter Burian (1968), Ph.D., *Associate Professor of Classical Studies*
 Marian Burke (1982), Ph.D., *Assistant Professor of Business Administration*
 Richard M. Burton (1970), D.B.A., *Associate Professor of Business Administration*
 Ronald Richard Butters (1967), Ph.D., *Associate Professor of English*
 Gale H. Buzzard (1957), Ph.D., *Assistant Professor of Mechanical Engineering*
 Edwin H. Cady (1973), Ph.D., *Andrew W. Mellon Professor in the Humanities*
 Clark R. Cahow (1960), Ph.D., *Professor in the Faculty of Arts and Sciences, History*
 John Clifford Cambier (1978), Ph.D., *Adjunct Associate Professor of Immunology*
 Dennis M. Campbell (1982), Ph.D., *Professor of Theology*
 Richard T. Campbell (1974), Ph.D., *Associate Professor of Sociology*
 Enrico Mario Camporesi (1977), M.D., *Assistant Professor of Physiology*
 Nell Cant (1978), Ph.D., *Assistant Professor of Anatomy*
 Robert Capettini (1980), Ph.D., *Associate Professor of Business Administration*
 Peter F. Carbone (1966), Ed.D., *Associate Professor of Education*
 Christopher R. Carroll (1981), Ph.D., *Assistant Professor of Electrical Engineering*
 Robert C. Carson (1960), Ph.D., *Professor of Psychology*
 Reginald D. Carter (1971), Ph.D., *Adjunct Assistant Professor of Physiology*
 Matt Cartmill (1969), Ph.D., *Professor of Anatomy and Professor of Anthropology*
 Ernesto Caserta (1970), Ph.D., *Associate Professor of Romance Languages*
 H. Craig Casey, Jr. (1979), Ph.D., *Professor of Electrical Engineering*
 John H. Casseday (1972), Ph.D., *Associate Professor of Psychology*
 John Cell (1962), Ph.D., *Professor of History*
 Jack B. Chaddock (1966), Sc.D., *Professor of Mechanical Engineering*
 William Chafe (1971), Ph.D., *Professor of History*
 Jagdish Chandra (1974), Ph.D., *Adjunct Professor of Mathematics*
 Margaret Cheney (1984), Ph.D., *Assistant Professor of Mathematics*
 Donald B. Chesnut (1965), Ph.D., *Professor of Chemistry*
 Norman L. Christensen, Jr. (1973), Ph.D., *Associate Professor of Botany*
 Elizabeth Ann Clark (1982), Ph.D., *Professor of Religion*
 Howard G. Clark (1968), Ph.D., *Professor of Biomedical Engineering and Professor of Materials Science*
 Frederic N. Cleaveland (1971), Ph.D., *Professor of Political Science*
 Charles T. Clotfelter (1979), Ph.D., *Professor of Public Policy Studies and Professor of Economics*
 Franklin H. Cocks (1972), Sc.D., *Professor of Materials Science*
 Kalman J. Cohen (1974), Ph.D., *Distinguished Bank Research Professor and Professor of Business Administration*
 John D. Coie (1968), Ph.D., *Professor of Psychology*
 Jeffrey J. Collins (1974), Ph.D., *Associate Professor of Microbiology and Immunology*
 Joel Colton (1947), Ph.D., *Professor of History*
 William K. Condrell (1982), J.D., *Adjunct Professor of Forestry*

¹Sabbatical leave January 1, 1985, through December 31, 1985.

William E. Conner (1979), Ph.D., Assistant Professor of Zoology
 Cecilia A. Conrad (1982), Ph.D., Assistant Professor of Economics
 Robert Franklin Conrad (1978), Ph.D., Assistant Professor of Economics
 Philip J. Cook (1973), Ph.D., Professor of Public Policy Studies and Professor of Economics
 James P. Cooney, Jr. (1981), Ph.D., Professor of Health Administration
 Thomas Howard Cordle (1950), Ph.D., Professor of Romance Languages
 Joseph M. Corless (1972), M.D., Ph.D., Associate Professor of Anatomy
 Roger J. Corless (1970), Ph.D., Associate Professor of Religion
 Ronald B. Corley (1977), Ph.D., Associate Professor of Immunology
 Bruce Hayward Corliss (1984), Ph.D., Associate Professor of Geology
 Philip R. Costanzo (1968), Ph.D., Professor of Psychology
 Martin Joseph Costello III (1975), Ph.D., Assistant Professor of Anatomy
 John D. Costlow, Jr. (1959), Ph.D., Professor of Zoology
 Sheila J. Counce (1968), Ph.D., Professor of Anatomy
 Ellen F. Cox (1982), Ph.D., Assistant Professor of Business Administration
 John Crellin (1977), Ph.D., Associate Professor of Community and Family Medicine (Medical History)
 Peter Cresswell (1973), Ph.D., Associate Professor of Immunology
 Herbert F. Crovitz (1963), Ph.D., Adjunct Professor of Psychology
 Alvin L. Crumbliss (1970), Ph.D., Associate Professor of Chemistry
 Pedro Cuatrecasas (1980), M.D., Adjunct Professor of Pharmacology
 Chicita F. Culberson (1971), Ph.D., Adjunct Professor of Botany and Senior Research Associate
 William Louis Culberson (1955), Ph.D., Hugo L. Blomquist Professor of Botany
 David L. Cusic (1980), M.H.A., M.P.H., Adjunct Assistant Professor of Health Administration
 Ronald Y. Cusson (1970), Ph.D., Professor of Physics
 David G. Davies (1961), Ph.D., Professor of Economics
 Calvin D. Davis (1962), Ph.D., Professor of History
 James Norman Davis (1972), M.D., Associate Professor of Pharmacology
 Lucy T. Davis (1969), Ed.D., Associate Professor of Education
 Jeffrey R. Dawson (1972), Ph.D., Associate Professor of Immunology
 Eugene Davis Day (1962), Ph.D., Professor of Immunology
 Ruth S. Day (1978), Ph.D., Associate Professor of Psychology
 David C. Dellinger (1968), Ph.D., Associate Professor of Business Administration
 Frank C. De Lucia (1969), Ph.D., Professor of Physics
 Neil Barry de Marchi (1971-80; 1983), Ph.D., Associate Professor of Economics
 A. Leigh DeNeef (1969), Ph.D., Associate Professor of English
 Vincent W. Dennis (1973), M.D., Assistant Professor of Physiology
 Irving T. Diamond (1958), Ph.D., James B. Duke Professor of Psychology, Professor of Physiology, and Lecturer in Anatomy
 Joseph Di Bona (1967), Ph.D., Associate Professor of Education
 Richard T. Di Giulio (1982), Ph.D., Assistant Professor of Ecotoxicology
 Arlene J. Diosegy, (1984), J.D., Adjunct Assistant Professor of Health Administration
 Ronald J. DiPerna (1982), Ph.D., Professor of Mathematics
 Arif Dirlik (1971), Ph.D., Associate Professor of History
 David A. Dittman (1978), Ph.D., Associate Professor of Business Administration
 Virginia R. Domínguez (1979), Ph.D., Assistant Professor of Anthropology
 William J. Donelan (1982), M.S., Adjunct Assistant Professor of Health Administration
 Fenner Douglass (1974), M.Mus., Professor of Music
 Earl H. Dowell (1983), Sc.D., Professor of Mechanical Engineering
 John W. Drake (1980), Ph.D., Adjunct Professor in the Genetics Program
 Fred I. Dretske (1985), Ph.D., Patterson Visiting Professor of Philosophy
 Bernard I. Duffey (1963), Ph.D., Professor of English
 Pamela W. Duncan (1979), M.A.C.T., Assistant Professor of Physical Therapy
 Robert F. Durden (1952), Ph.D., Professor of History
 George F. Dutrow (1976), Ph.D., Adjunct Associate Professor of Forest Economics
 Elaine Martha Eckel (1974), M.A., Assistant Clinical Professor of Physical Therapy
 Carol O. Eckerman (1972), Ph.D., Associate Professor of Psychology
 David M. Eddy (1981), M.D., Ph.D., Professor of Public Policy Studies and Professor of Community and Family Medicine
 Julie A. Edell (1981), Ph.D., Assistant Professor of Business Administration
 Leah Edelstein (1984), Ph.D., Lecturer in Mathematics
 Eric L. Effmann (1977), M.D., Associate Professor of Anatomy
 Jane G. Elchlepp (1960), M.D., Ph.D., Associate Professor of Pathology
 Albert Eldridge (1970), Ph.D., Associate Professor of Political Science
 Everett H. Ellinwood, Jr. (1966), M.D., Professor of Pharmacology
 Ernest Elsevier (1950), M.S., Associate Professor of Mechanical Engineering
 Sharyn Endow (1978), Ph.D., Associate Professor of Microbiology

- Peter C. English (1978), M.D., Ph.D., *Assistant Professor of History*
- Robert M. Entman (1980), Ph.D., *Assistant Professor of Public Policy Studies and Assistant Professor of Political Science*
- Carl J. Erickson (1966), Ph.D., *Professor of Psychology*
- Harold P. Erickson (1970), Ph.D., *Professor of Anatomy*
- Robert P. Erickson (1961), Ph.D., *Professor of Psychology and Associate Professor of Physiology*
- E. Harvey Estes, Jr. (1953), M.D., *Professor of Health Administration*
- Lawrence E. Evans (1963), Ph.D., *Professor of Physics*
- Janet J. Ewald (1984), Ph.D., *Assistant Professor of History*
- Richard B. Fair (1981), Ph.D., *Professor of Electrical Engineering*
- Henry A. Fairbank (1962), Ph.D., *Professor of Physics*
- David J. Falcone (1975), M.H.A., Ph.D., *Associate Professor of Health Administration and Assistant Professor of Political Science*
- John Morton Fein (1950), Ph.D., *Professor of Romance Languages*
- Michael T. Ferejohn (1983), Ph.D., *Assistant Professor of Philosophy*
- Oliver W. Ferguson (1957), Ph.D., *Professor of English*
- Bernard F. Fetter (1951), M.D., *Professor of Pathology*
- Peter G. Fish (1969), Ph.D., *Professor of Political Science*
- David Fitzpatrick (1983), Ph.D., *Assistant Professor of Anatomy*
- Daniel E. Flath (1977), Ph.D., *Assistant Professor of Mathematics*
- Joel Fleishman (1971), LL.M., *Professor of Public Policy Studies and Professor of Law*
- Donald J. Fluke (1958), Ph.D., *Professor of Zoology*
- John D. Forsyth (1978), D.B.A., *Professor of Business Administration*
- Lloyd R. Fortney (1964), Ph.D., *Associate Professor of Physics*
- ²Richard B. Forward (1971), Ph.D., *Associate Professor of Zoology*
- Richard G. Fox (1968), Ph.D., *Professor of Anthropology*
- Bertram O. Fraser-Reid (1983), Ph.D., *Professor of Chemistry*
- Deborah Anne Freund (1980), Ph.D., *Adjunct Assistant Professor of Health Administration*
- Irwin Fridovich (1958), Ph.D., *James B. Duke Professor of Biochemistry*
- Ernestine Friedl (1973), Ph.D., *James B. Duke Professor of Anthropology*
- Thomas M. Gallie, Jr. (1954-55; 1956), Ph.D., *Professor of Computer Science*
- Miguel Garci-Gómez (1973), Ph.D., *Associate Professor of Romance Languages*
- Grant W. Gardner (1981), Ph.D., *Assistant Professor of Business Administration*
- Devendra P. Garg (1972), Ph.D., *Professor of Mechanical Engineering*
- David Barry Gaspar (1983), Ph.D., *Assistant Professor of History*
- Raymond Gavins (1970), Ph.D., *Associate Professor of History*
- W. Scott Gehman, Jr. (1954), Ph.D., *Professor of Psychology in Education*
- Linda K. George (1976), Ph.D., *Associate Professor of Sociology*
- Rhett Truesdale George, Jr. (1957), Ph.D., *Assistant Professor of Electrical Engineering*
- Gerald E. Gerber (1962), Ph.D., *Associate Professor of English*
- Gary Gereffi (1980), Ph.D., *Assistant Professor of Sociology*
- John F. Geweke (1983), Ph.D., *Professor of Economics*
- Michael A. Gillespie (1983), Ph.D., *Assistant Professor of Political Science*
- Nicholas W. Gillham (1968), Ph.D., *Professor of Zoology*
- Stephen Malcolm Gillis (1984), Ph.D., *Professor of Public Policy Studies and Professor of Economics*
- Kenneth E. Glander (1975), Ph.D., *Associate Professor of Anthropology*
- Robert F. Gleckner (1978), Ph.D., *Professor of English*
- Rona Goffen (1978), Ph.D., *Associate Professor of Art*
- Martin P. Golding (1976), Ph.D., *Professor of Philosophy*
- Craufurd Goodwin (1962), Ph.D., *James B. Duke Professor of Economics*
- Lawrence C. Goodwyn (1971), Ph.D., *Associate Professor of History*
- Andrew Gordon (1985), Ph.D., *Assistant Professor of History*
- Ulrich M. Gosele (1984), Ph.D., *Professor of Mechanical Engineering*
- Alfred T. Goshaw (1973), Ph.D., *Professor of Physics*
- Henry G. Grabowski (1972), Ph.D., *Professor of Economics*
- Daniel A. Graham (1969), Ph.D., *Professor of Economics*
- Doyle G. Graham (1970), M.D., Ph.D., *Associate Professor of Pathology*
- Ronald C. Greene (1958), Ph.D., *Associate Professor of Biochemistry*
- Joseph C. Greenfield (1962), M.D., *Associate Professor of Physiology*
- Arno L. Greenleaf (1977), Ph.D., *Associate Professor of Biochemistry*
- Robert C. Gregg (1974), Ph.D., *Associate Professor of Patristics and Medieval Church History*
- Joseph M. Grieco (1982), Ph.D., *Assistant Professor of Political Science*
- Phillip A. Griffiths (1983), Ph.D., *James B. Duke Professor of Mathematics*

²Sabbatical leave January 1, 1985, through December 31, 1985.

- ³Samson R. Gross (1960), Ph.D., *Professor of Genetics and Professor of Biochemistry*
Walter R. Guild (1960), Ph.D., *Professor of Biophysics*
John W. Gutknecht (1969), Ph.D., *Professor of Physiology*
Donald B. Hackel (1960), M.D., *Professor of Pathology*
Herbert Hacker, Jr. (1965), Ph.D., *Associate Professor of Electrical Engineering*
⁴Hugh Marshall Hall, Jr. (1952), Ph.D., *Professor of Political Science*
Warren G. Hall (1982), Ph.D., *Associate Professor of Psychology*
William C. Hall (1970), Ph.D., *Professor of Anatomy and Associate Professor of Psychology*
William E. Hammond (1968), Ph.D., *Professor of Biomedical Engineering*
Moo-Young Han (1967), Ph.D., *Professor of Physics*
Stuart Handwerker (1971), M.D., *Assistant Professor of Physiology*
Charles Morgan Harman (1961), Ph.D., *Professor of Mechanical Engineering*
William J. Hart (1977), M.P.A., *Adjunct Professor of Forestry and Environmental Studies*
Stanley Hauerwas (1984), Ph.D., *Professor of Theological Ethics*
Thomas M. Havrilesky (1969-70; 1971), Ph.D., *Professor of Economics*
Barton Ford Haynes (1980), M.D., *Assistant Professor of Immunology*
Milton Heath (1975), LL.B., *Adjunct Professor of Environmental Law*
Christine R. Hekman (1981), Ph.D., *Associate Professor of Business Administration*
Robert William Henkens (1968), Ph.D., *Associate Professor of Chemistry*
Eric Herbst (1980), Ph.D., *Associate Professor of Physics*
Jan Herlinger (1977), Ph.D., *Assistant Professor of Music*
Duncan Heron (1950), Ph.D., *Professor of Geology*
Cynthia B. Herrup (1984), Ph.D., *Assistant Professor of History*
Michael Steven Hershfield (1976), M.D., *Assistant Professor of Biochemistry*
Frederick Herzog (1960), Th.D., *Professor of Systematic Theology*
Elizabeth G. Higdon (1980), Ph.D., *Assistant Professor of Art*
Timothy K. Hight (1977), Ph.D., *Assistant Professor of Mechanical Engineering*
Robert L. Hill (1961), Ph.D., *James B. Duke Professor of Biochemistry*
Michael Lee Hines (1978), Ph.D., *Assistant Medical Research Professor of Physiology*
John F. Hoadley (1979), Ph.D., *Assistant Professor of Political Science*
Robert M. Hochmuth (1978), Ph.D., *Professor of Biomedical Engineering*
Richard Earl Hodel (1965), Ph.D., *Associate Professor of Mathematics*
Irving B. Holley, Jr. (1947), Ph.D., *Professor of History*
⁵Edward W. Holmes (1974), M.D., *Assistant Professor of Biochemistry*
Ole R. Holsti (1974), Ph.D., *George V. Allen Professor of Political Science*
Donald L. Horowitz (1980), LL.M., Ph.D., *Professor of Public Policy Studies and Professor of Political Science*
Robert E. Hoskin (1981), Ph.D., *Assistant Professor of Business Administration*
Jerry F. Hough (1973), Ph.D., *Professor of Political Science and Professor of Public Policy Studies*
Tao-shih Hsieh (1981), Ph.D., *Assistant Professor of Biochemistry*
Joel C. Huber (1978), Ph.D., *Associate Professor of Business Administration*
John S. Hughes (1976), Ph.D., *Associate Professor of Business Administration*
Alexander Hull (1962), Ph.D., *Associate Professor of Romance Languages*
William F. Hyde (1979), Ph.D., *Associate Professor of Forestry and Environmental Studies*
William L. Hylander (1971), Ph.D., *Professor of Anatomy and Associate Professor of Anthropology*
Kathryn N. Jackson (1982), Ph.D., *Assistant Professor of Philosophy*
Wallace Jackson (1965), Ph.D., *Professor of English*
B. Jon Jaeger (1972), Ph.D., *Professor of Health Administration*
Stephen Jaffe (1983), A.M., *Assistant Professor of Music*
Emma Raff Jakoi (1977), Ph.D., *Assistant Professor of Anatomy*
Harold R. Jantz (1976), Ph.D., *Visiting Professor of Germanic Languages and Literature*
Benjamin A. Jayne (1976), Ph.D., *Professor of Forestry*
Peter W. Jeffs (1964), Ph.D., *Professor of Chemistry*
Robert B. Jennings (1975), M.D., *James B. Duke Professor of Pathology*
Randy L. Jirtle (1977), Ph.D., *Assistant Professor of Pathology*
Frans F. Jöbsis (1964), Ph.D., *Professor of Physiology*
Sheridan Johns III (1970), Ph.D., *Associate Professor of Political Science*
Charles B. Johnson (1956), Ed.D., *Associate Professor of Education*
Edward A. Johnson (1963), M.D., *James B. Duke Professor of Physiology*
Terry W. Johnson, Jr. (1954), Ph.D., *Professor of Botany*
Thomas C. Johnson (1983), Ph.D., *Associate Professor of Geology*
Stephen A. Johnston (1983), Ph.D., *Assistant Professor of Botany*

³Sabbatical leave September 1, 1985, through August 31, 1986.

⁴Leave of absence.

⁵Sabbatical leave July 1, 1985 through June 30, 1986.

William H. Johnston (1983), B.B.A., *Adjunct Assistant Professor of Health Administration*
 William W. Johnston (1963), M.D., *Professor of Pathology*
 William Thomas Joines (1966), Ph.D., *Professor of Electrical Engineering*
 Wolfgang Karl Joklik (1968), D.Phil., *James B. Duke Professor of Microbiology and Immunology*
 Buford Jones (1962), Ph.D., *Associate Professor of English*
 Phillip L. Jones (1977), Ph.D., *Research Professor of Materials Science*
 Burke H. Judd (1980), Ph.D., *Adjunct Professor in the Genetics Program*
 Arnold D. Kaluzny (1975), Ph.D., *Adjunct Professor of Health Administration*
 Henry Kamin (1948), Ph.D., *Professor of Biochemistry*
 Kirk R. Karwan (1981), Ph.D., *Assistant Professor of Business Administration*
 Bernard Kaufman (1968), Ph.D., *Associate Professor of Biochemistry*
 Russel E. Kaufman (1984), M.D., *Assistant Professor of Biochemistry*
 Richard F. Kay (1973), Ph.D., *Professor of Anatomy and Adjunct Associate Professor of Anthropology*
 Jack D. Keene (1979), Ph.D., *Associate Professor of Virology*
 Thomas F. Keller (1959), Ph.D., *R. J. Reynolds Industries Professor of Business Administration*
 Allen C. Kelley (1972), Ph.D., *Professor of Economics*
 Alan C. Kerckhoff (1958), Ph.D., *Professor of Sociology*
 Robert B. Kerr (1965), Ph.D., *Professor of Electrical Engineering*
 Kent P. Kimbrough (1981), Ph.D., *Assistant Professor of Economics*
 Norman Kirshner (1956), Ph.D., *Professor of Pharmacology and Professor of Biochemistry*
 Joseph Weston Kitchen, Jr. (1962), Ph.D., *Associate Professor of Mathematics*
 Herbert P. Kitschelt (1984), Ph.D., *Assistant Professor of Political Science*
 Gordon K. Klintworth (1964), M.D., Ph.D., *Professor of Pathology*
 Peter H. Klopfer (1958), Ph.D., *Professor of Zoology*
 Kenneth R. Knoerr (1961), Ph.D., *Professor of Forest Meteorology and Associate Professor of Botany*
 John A. Koepke (1979), M.D., *Professor of Pathology*
 J. Mailen Kootsey (1971-76; 1979), Ph.D., *Research Associate Professor of Computer Science and Associate Professor of Physiology*
 Hillel S. Koren (1976), Ph.D., *Adjunct Associate Professor of Immunology*
 Allan Kornberg (1965), Ph.D., *Professor of Political Science*
 Wesley A. Kort (1965), Ph.D., *Professor of Religion*
 David Paul Kraines (1970), Ph.D., *Associate Professor of Mathematics*
 Nicholas Michael Kredich (1968), M.D., *Assistant Professor of Biochemistry*
 Irwin Kremen (1963), Ph.D., *Assistant Professor of Psychology*
 Kenneth N. Kreuzer (1984), Ph.D., *Assistant Professor of Microbiology*
 William R. Krigbaum (1952), Ph.D., *James B. Duke Professor of Chemistry*
 Magnus Jan Krynski (1966), Ph.D., *Professor of Slavic Languages and Literatures*
 Cynthia Moreton Kuhn (1978), Ph.D., *Associate Professor of Pharmacology*
 Bruce R. Kuniholm (1977), Ph.D., *Associate Professor of Public Policy Studies and Associate Professor of History*
 Johannes A. Kylstra (1965), M.D., Ph.D., *Associate Professor of Physiology*
 Leon Lack (1965), Ph.D., *Professor of Pharmacology*
 Creighton Lacy (1953), Ph.D., *Professor of World Christianity*
 Martin Lakin (1958), Ph.D., *Professor of Psychology*
 Michael K. Lamvik (1982), Ph.D., *Assistant Professor of Anatomy*
 David L. Lange (1971), LL.B., *Professor of Public Policy Studies and Communications Policy*
 Peter Lange (1982), Ph.D., *Associate Professor of Political Science*
 Thomas A. Langford (1956), Ph.D., *Professor of Systematic Theology*
 Peter K. Lauf (1968), M.D., *Professor of Physiology*
 Dan Laughhunn (1968-75; 1976), D.B.A., *Professor of Business Administration*
 Gregory F. Lawler (1979), Ph.D., *Assistant Professor of Mathematics*
 Bruce B. Lawrence (1971), Ph.D., *Professor of Religion*
 Richard H. Leach (1955), Ph.D., *Professor of Political Science*
 Robert Lefkowitz (1973), M.D., *Assistant Professor of Biochemistry*
 Frank Lentricchia (1984), Ph.D., *Professor of English*
 Warren Lerner (1961), Ph.D., *Professor of History*
 Arie Y. Lewin (1974), Ph.D., *Professor of Business Administration*
 Harold Walter Lewis (1946), Ph.D., *University Distinguished Service Professor of Physics*
 Melvyn Lieberman (1968), Ph.D., *Professor of Physiology*
 Chia-Sheng Lin (1981), Ph.D., *Assistant Professor of Anatomy*
 C. Eric Lincoln (1976), Ph.D., *Professor of Sociology of Religion*
 Elwood A. Linney (1984), Ph.D., *Associate Professor of Microbiology*
 Joseph Lipscomb, Jr. (1974), Ph.D., *Associate Professor of Public Policy Studies*
 Daniel A. Livingstone (1956), Ph.D., *James B. Duke Professor of Zoology*
 John E. Lochman (1984), Ph.D., *Lecturer in Psychology*
 Charles H. Lochmüller (1969), Ph.D., *Professor of Chemistry and Professor of Biomedical Engineering*
 Gregory R. Lockhead (1965), Ph.D., *Professor of Psychology*

David Dick Loendorf (1981), Ph.D., *Associate Professor of Mechanical Engineering*
 Timothy J. Lomperis (1984), Ph.D., *Assistant Professor of Political Science*
 Charles Houston Long (1974), Ph.D., *Professor of Religion*
 William Longley (1968), Ph.D., *Associate Professor of Anatomy*
 Donald Loveland (1973), Ph.D., *Professor of Computer Science*
 John Charles Lucchesi (1980), Ph.D., *Adjunct Professor in the Genetics Program*
 Michael I. Luger (1980), Ph.D., *Assistant Professor of Public Policy Studies and Assistant Professor of Economics*
 John G. Lundberg (1970), Ph.D., *Associate Professor of Zoology*
 William S. Lynn, Jr. (1954), M.D., *Associate Professor of Biochemistry*
 John M. McCann (1978), Ph.D., *Associate Professor of Business Administration*
 Kenneth S. McCarty (1959), Ph.D., *Professor of Biochemistry*
 Kenneth Scott McCarty, Jr. (1976), M.D., Ph.D., *Associate Professor of Pathology*
 David R. McClay (1973), Ph.D., *Associate Professor of Zoology and Assistant Professor of Immunology*
 John B. McConahay (1974), Ph.D., *Associate Professor of Public Policy Studies and Associate Professor of Psychology*
 James H. McElhaney (1973), Ph.D., *Professor of Biomedical Engineering*
 Marjorie McElroy (1970), Ph.D., *Associate Professor of Economics*
 Philip A. McHale (1972), Ph.D., *Adjunct Assistant Professor of Physiology*
 Thomas J. McIntosh (1977), Ph.D., *Associate Professor of Anatomy*
 Margaret A. McKean (1974), Ph.D., *Associate Professor of Political Science*
 Patrick A. McKee (1969), M.D., *Assistant Professor of Biochemistry*
 John C. McKinney (1957), Ph.D., *Professor of Sociology*
 Thomas J. McManus (1961), M.D., *Associate Professor of Physiology*
 James O. McNamara (1973), M.D., *Assistant Professor of Pharmacology*
 Andrew T. McPhail (1968), Ph.D., *Professor of Chemistry*
 Richard A. MacPhail (1984), Ph.D., *Assistant Professor of Chemistry*
 Ross D. E. MacPhee (1979), Ph.D., *Assistant Professor of Anatomy*
 George L. Maddox, Jr. (1960), Ph.D., *Professor of Sociology*
 Wesley A. Magat (1974), Ph.D., *Associate Professor in Fuqua School of Business and Associate Professor of Public Policy Studies*
 Lynn A. Maguire (1982), Ph.D., *Assistant Professor and Research Associate in Forest Ecology*
 Edward P. Mahoney (1965), Ph.D., *Professor of Philosophy*
 Lazaro J. Mandel (1972), Ph.D., *Professor of Physiology*
 Kenneth G. Manton (1977), Ph.D., *Research Associate Professor of Demographic Studies*
 Richard B. Marchase (1978), Ph.D., *Assistant Professor of Anatomy*
 Carlos M. Marin (1982), Ph.D., *Assistant Professor of Hydrology and Assistant Professor of Civil Engineering*
 Peter N. Marinos (1968), Ph.D., *Professor of Electrical Engineering and Professor of Computer Science*
 Gail R. Marsh (1969), Ph.D., *Lecturer in Psychology*
 Robert C. Marshall (1983), Ph.D., *Assistant Professor of Economics*
 Anne L. Martin (1984), Ph.D., *Assistant Professor of Health Administration*
 Hisham Z. Massoud (1983), Ph.D., *Assistant Professor of Electrical Engineering*
 Seymour Mauskopf (1964), Ph.D., *Professor of History*
 Joseph B. Mazzola (1984), Ph.D., *Associate Professor of Business Administration*
 Miguel A. Medina, Jr. (1976), Ph.D., *Associate Professor of Civil and Environmental Engineering*
 Elgin W. Mellow, Jr. (1965), Ph.D., *Associate Professor of English*
 Robert J. Melosh (1978), Ph.D., *Professor of Civil Engineering*
 Daniel B. Menzel (1971), Ph.D., *Professor of Pharmacology*
 Richard S. Metzgar (1962), Ph.D., *Professor of Immunology*
 Johannes Horst Max Meyer (1959), Ph.D., *Professor of Physics*
 Carol L. Meyers (1979), Ph.D., *Associate Professor of Religion*
 Eric M. Meyers (1969), Ph.D., *Professor of Religion*
 George Michalopoulos (1977), M.D., Ph.D., *Associate Professor of Pathology*
 Michael John Miksis (1983), Ph.D., *Assistant Professor of Mathematics*
 Christine E. Miller (1984), Ph.D., *Assistant Professor of Biomedical Engineering*
 Martin Miller (1970), Ph.D., *Associate Professor of History*
 Sara Elizabeth Miller (1973), Ph.D., *Associate Medical Research Professor of Microbiology*
 Elliott Mills (1968), Ph.D., *Professor of Pharmacology and Associate Professor of Physiology*
 Brent Drennen Mishler (1984), Ph.D., *Assistant Professor of Botany*
 Thomas G. Mitchell (1974), Ph.D., *Associate Professor of Mycology*
 Paul L. Modrich (1976), Ph.D., *Professor of Biochemistry*
 Gerald Monsman (1965), Ph.D., *Professor of English*
 John W. Moore (1961), Ph.D., *Professor of Physiology*
 Lawrence C. Moore, Jr. (1966), Ph.D., *Associate Professor of Mathematics*
 Richard C. Morey (1978), Ph.D., *Professor of the Practice of Management Sciences*
 Montrose J. Moses (1959), Ph.D., *R. J. Reynolds Industries Professor in Medical Education in the Department of Anatomy*

Bruce J. Muga (1967), Ph.D., *Professor of Civil Engineering*
 Roland E. Murphy (1967-68; 1971), S.T.D., *George Washington Ivey Professor of Old Testament*
 George C. Myers (1968), Ph.D., *Professor of Sociology*
 J. Victor Nadler (1978), Ph.D., *Associate Professor of Pharmacology*
 Dana W. Nance (1983), Ph.D., *Assistant Professor of Mathematics*
 Sydney Nathans (1966), Ph.D., *Associate Professor of History*
 Thomas H. Naylor (1964), Ph.D., *Professor of Business Administration*
 Francis Newton (1967), Ph.D., *Professor of Latin in Classical Studies*
 Charles Adam Nichol (1970), Ph.D., *Adjunct Professor of Pharmacology*
 David Bruce Nickerson (1981), Ph.D., *Assistant Professor of Economics*
 Robert Bruce Nicklas (1965), Ph.D., *Professor of Zoology and Professor of Anatomy*
 Frederik Nijhout (1977), Ph.D., *Associate Professor of Zoology*
 Mary M. Nijhout (1982), Ph.D., *Assistant Professor of Zoology*
 Loren W. Nolte (1966), Ph.D., *Professor of Electrical Engineering and Professor of Biomedical Engineering*
 Holger O. Nygard (1960), Ph.D., *Professor of English*
 John F. Oates (1967), Ph.D., *Professor of Ancient History in Classical Studies*
 Jean Fox O'Barr (1969), Ph.D., *Adjunct Associate Professor of Political Science*
 William M. O'Barr (1969), Ph.D., *Professor of Anthropology*
 Fearghus O'Foghludha (1975), Ph.D., *Adjunct Professor of Physics*
 Seog Oh (1984), Ph.D., *Assistant Professor of Physics*
 Angela O'Rand (1979), Ph.D., *Assistant Professor of Sociology*
 Linda Orr (1980), Ph.D., *Associate Professor of Romance Languages*
 Robert T. Osborn (1954), Ph.D., *Professor of Religion*
 Suydam Osterhout (1959), M.D., Ph.D., *Professor of Microbiology*
 Michael C. Ostrowski (1984), Ph.D., *Assistant Professor of Microbiology*
 Rafael Osuna (1977), Ph.D., *Professor of Romance Languages*
 Athos Ottolenghi (1959), M.D., *Professor of Pharmacology*
 Harry Ashton Owen, Jr. (1951), Ph.D., *Professor of Electrical Engineering*
 George M. Padilla (1965), Ph.D., *Associate Professor of Physiology*
 Ellis B. Page (1979), Ed.D., *Professor of Education*
 David L. Paletz (1967), Ph.D., *Professor of Political Science*
 Richard A. Palmer (1966), Ph.D., *Professor of Chemistry*
 Richard G. Palmer (1977), Ph.D., *Associate Professor of Physics*
 Erdman B. Palmore (1967), Ph.D., *Professor of Sociology*
 William Leslie Pardon (1977), Ph.D., *Associate Professor of Mathematics*
 Harry B. Partin (1964), Ph.D., *Associate Professor of Religion*
 Eric I. Pas (1980), Ph.D., *Associate Professor of Civil Engineering*
 Merrell Lee Patrick (1964), Ph.D., *Professor of Computer Science*
 David T. Patterson (1980), Ph.D., *Adjunct Assistant Professor of Botany*
 John W. Payne (1977), Ph.D., *Professor of Business Administration*
 William Bernard Peach (1951), Ph.D., *Professor of Philosophy*
 George Wilbur Pearsall (1964), Sc.D., *Professor of Mechanical Engineering and Materials Science and Professor of Public Policy Studies*
 J. Jeffrey Peirce (1981), Ph.D., *Associate Professor of Civil Engineering*
 Gustavo F. Pérez (1978), Ph.D., *Associate Professor of Romance Languages*
 Ronald D. Perkins (1968), Ph.D., *Professor of Geology*
 Melvin K. H. Peters (1983), Ph.D., *Associate Professor of Religion*
 Henry J. Petroski (1980), Ph.D., *Associate Professor of Civil Engineering*
 Leland R. Phelps (1961), Ph.D., *Professor of Germanic Languages and Literature*
 Orrin Pilkey (1965), Ph.D., *Professor of Geology*
 Theo C. Pilkington (1961), Ph.D., *Professor of Biomedical Engineering and Professor of Electrical Engineering*
 Christopher D. Piro (1983), Ph.D., *Assistant Professor of Business Administration*
 David Stephen Pisetsky (1978), M.D., Ph.D., *Assistant Professor of Immunology*
 Salvatore V. Pizzo (1976), M.D., Ph.D., *Associate Professor of Pathology and Assistant Professor of Biochemistry*
 Robert Plonsey (1983), Ph.D., *Professor of Biomedical Engineering*
 Jacques C. Poirier (1955), Ph.D., *Professor of Chemistry*
 Joseph A. Porter (1980), Ph.D., *Assistant Professor of English*
 Ned Allen Porter (1969), Ph.D., *Professor of Chemistry*
 Carl J. Posy (1981), Ph.D., *Associate Professor of Philosophy*
 William H. Poteat (1960), Ph.D., *Professor of Religion and Professor of Comparative Studies*
 Marios C. Pouagare (1984), Ph.D., *Assistant Professor of Mechanical Engineering*
 Philip Pratt (1966), M.D., *Professor of Pathology*
 Jack J. Preiss (1959), Ph.D., *Professor of Sociology*
 David Eugene Price (1973), Ph.D., *Professor of Political Science and Professor of Public Policy Studies*
 Martha Putallaz (1983), Ph.D., *Assistant Professor of Psychology*
 Louis DuBose Quin (1957), Ph.D., *James B. Duke Professor of Chemistry*

Alician Veronica Quinlan (1983), Ph.D., Associate Professor of Mechanical Engineering and Associate Professor of Environmental Engineering

Naomi Quinn (1972), Ph.D., Associate Professor of Anthropology

K. V. Rajagopalan (1966), Ph.D., Professor of Biochemistry

Dietolf Ramm (1971), Ph.D., Associate Research Professor of Computer Science

Joseph S. Ramus (1978), Ph.D., Associate Professor of Botany

Dale B. J. Randall (1957), Ph.D., Professor of English

Mark D. Rausher (1978), Ph.D., Associate Professor of Zoology

Kenneth H. Reckhow (1980), Ph.D., Assistant Professor of Forestry and Environmental Studies and Assistant Professor of Civil and Environmental Engineering

William M. Reddy (1977), Ph.D., Assistant Professor of History

Michael Charles Reed (1974), Ph.D., Professor of Mathematics

Michael Kay Reedy (1969), M.D., Associate Professor of Anatomy

Keith Arnold Reimer (1975), Ph.D., M.D., Associate Professor of Pathology

Lucy J. Reuben (1983), Ph.D., Assistant Professor of Business Administration

Jacqueline A. Reynolds (1969), Ph.D., Professor of Physiology

John F. Richards (1977), Ph.D., Professor of History

Curtis J. Richardson (1977), Ph.D., Associate Professor of Resource Ecology

David Claude Richardson (1969), Ph.D., Associate Professor of Biochemistry

Lawrence Richardson, Jr. (1966), Ph.D., James B. Duke Professor of Latin in Classical Studies

William E. Ricks (1980), Ph.D., Assistant Professor of Business Administration

Stephen J. Riederer (1983), Ph.D., Assistant Professor of Biomedical Engineering

Kent J. Rigsby (1971), Society of Fellows (Harvard), Associate Professor of Classical Studies

Mary Ellen Riordan (1978), M.S., Assistant Clinical Professor of Physical Therapy

Nathan Russell Roberson (1963), Ph.D., Professor of Physics

Darryl Lamont Roberts (1984), Ph.D., Assistant Professor of Political Science

George W. Roberts (1971), Ph.D., Associate Professor of Philosophy

D. W. Robertson (1982), Ph.D., Visiting Professor of English

J. David Robertson (1966), M.D., Ph.D., James B. Duke Professor of Anatomy

Hugh G. Robinson (1964), Ph.D., Professor of Physics

Sandra P. Robinson (1983), Ph.D., Assistant Professor of Religion

Herman R. Robl (1959-64; 1966), Ph.D., Adjunct Professor of Physics

Alex Roland (1981), Ph.D., Associate Professor of History

James L. Rolleston (1975), Ph.D., Associate Professor of Germanic Languages and Literature

Gerald Martin Rosen (1972), Ph.D., Associate Professor of Pharmacology

Arnold L. Rosenberg (1981), Ph.D., Professor of Computer Science

Jonathan B. Rosenberg (1983), Ph.D., Adjunct Assistant Professor of Computer Science

Bruce R. Rosendahl (1976), Ph.D., Associate Professor of Geology

Allen D. Roses (1970), M.D., Assistant Professor of Biochemistry

Wendell F. Rosse (1966), M.D., Professor of Immunology

Susan Roth (1973), Ph.D., Associate Professor of Psychology

Virginia Louise Roth (1983), Ph.D., Assistant Professor of Zoology

Jack P. Royer (1978), Ph.D., Assistant Professor of Forestry and Environmental Studies

David C. Rubin (1978), Ph.D., Associate Professor of Psychology

Clyde de Loache Ryals (1973), Ph.D., Professor of English

Harvey J. Sage (1964), Ph.D., Associate Professor of Biochemistry and Associate Professor of Immunology

Edward A. Saibel (1975), Ph.D., Adjunct Professor of Civil Engineering

John V. Salzano (1958), Ph.D., Professor of Physiology

Alfred Paul Sanfilippo (1979), M.D., Ph.D., Associate Professor of Pathology

David H. Sanford (1970), Ph.D., Professor of Philosophy

Jack Murad Sasson (1983), Ph.D., Visiting Adjunct Professor in Religion

Robert N. Sawyer (1976), Ed.D., Associate Professor of Education

Frederick H. Schachat (1977), Ph.D., Assistant Professor of Anatomy

David G. Schaeffer (1978), Ph.D., Professor of Mathematics

Saul M. Schanberg (1967), M.D., Ph.D., Professor of Pharmacology

Harold Schiffman (1963), Ph.D., Professor of Psychology

Susan S. Schiffman (1972), Ph.D., Lecturer in Psychology

William H. Schlesinger (1980), Ph.D., Associate Professor of Botany

Roger W. Schmenner (1980), Ph.D., Associate Professor of Business Administration

Knut Schmidt-Nielsen (1952), Ph.D., James B. Duke Professor of Physiology

Chadmark L. Schoen (1982), Ph.D., Assistant Professor of Mathematics

Stanley Clifford Schold, Jr. (1978), M.D., Assistant Professor of Pathology

David W. Schomberg (1968), Ph.D., Associate Professor of Physiology

Maria E. Schonbek (1982), Ph.D., Associate Professor of Mathematics

Herbert L. Schuette (1981), Ph.D., Assistant Professor of Business Administration

Anne Firor Scott (1961), Ph.D., William K. Boyd Professor of History

David W. Scott (1971), Ph.D., *Adjunct Professor of Immunology*
 William E. Scott (1958), Ph.D., *Professor of History*
 Richard A. Scoville (1961), Ph.D., *Associate Professor of Mathematics*
 Richard B. Searles (1965), Ph.D., *Professor of Botany*
 W. David Sedwick (1976), Ph.D., *Assistant Medical Research Professor of Microbiology*
 Tilman Seebass (1977), Ph.D., *Associate Professor of Music*
 Hilliard Foster Seigler (1967), M.D., *Professor of Immunology*
 Edward J. Shaughnessy, Jr. (1975), Ph.D., *Associate Professor of Mechanical Engineering*
 Barbara R. Shaw (1975), Ph.D., *Associate Professor of Chemistry*
 Michael Shearer (1979), D.Phil., *Assistant Professor of Mathematics*
 John Shelburne (1973), M.D., Ph.D., *Associate Professor of Pathology*
 Marion L. Shepard (1967), Ph.D., *Professor of Materials Science*
 Blair H. Sheppard (1981), Ph.D., *Assistant Professor of Business Administration*
 Sudhir Shetty (1984), Ph.D., *Assistant Professor of Public Policy Studies and Assistant Professor of Economics*
 Joseph R. Shoenfield (1952), Ph.D., *Professor of Mathematics*
 Brij Bhushan Shrivastav (1973), Ph.D., *Assistant Medical Research Professor of Pharmacology*
 James N. Siedow (1976), Ph.D., *Associate Professor of Botany*
 Lewis M. Siegel (1968), Ph.D., *Professor of Biochemistry*
 Alexander Silbiger (1984), Ph.D., *Visiting Associate Professor of Music*
 Sidney Arthur Simon (1974), Ph.D., *Associate Professor of Physiology*
 Elwyn L. Simons (1977), Ph.D., D.Phil., *James B. Duke Professor of Anthropology and Professor of Anatomy*
 Ida Harper Simpson (1959), Ph.D., *Professor of Sociology*
 William R. Sizemore (1982), Ph.D., *Adjunct Professor of Forestry*
 Theodore Alan Slotkin (1971), Ph.D., *Professor of Pharmacology*
 Carol A. Smith (1974), Ph.D., *Associate Professor of Anthropology*
 Connie U. Smith (1980), Ph.D., *Assistant Professor of Computer Science*
 D. Moody Smith (1965), Ph.D., *Professor of New Testament Interpretation*
 David A. Smith (1962), Ph.D., *Associate Professor of Mathematics*
 Donald S. Smith II (1961), M.H.A., *Assistant Professor of Health Administration*
 Grover C. Smith (1952), Ph.D., *Professor of English*
 Harmon L. Smith (1959), Ph.D., *Professor of Moral Theology*
 Joel Smith (1958), Ph.D., *Professor of Sociology*
 Kathleen P. Smith (1980), Ph.D., *Assistant Professor of Anatomy*
 Peter Smith (1959), Ph.D., *Professor of Chemistry*
 Peter G. Smith (1982), Ph.D., *Assistant Medical Research Professor of Pharmacology*
 Ralph Snyderman (1971), M.D., *Professor of Immunology*
 George G. Somjen (1963), M.D., *Professor of Physiology*
 Joachim R. Sommer (1957), M.D., *Professor of Pathology*
 Madison S. Spach (1958), M.D., *Professor of Physiology*
 John R. Spencer (1978), Ph.D., *Professor of Art*
 Kenneth I. Spenner (1984), Ph.D., *Assistant Professor of Sociology*
 Thomas Arthur Spragens, Jr. (1967), Ph.D., *Professor of Political Science*
 Carol B. Stack (1975), Ph.D., *Associate Professor of Public Policy Studies and Adjunct Associate Professor of Anthropology*
 John E. R. Staddon (1967), Ph.D., *James B. Duke Professor of Psychology and Professor of Zoology*
 Richard Staelin (1982), Ph.D., *Edward and Rose Donnell Professor of Business Administration*
 Dale O. Stahl II (1982), Ph.D., *Assistant Professor of Economics*
 William J. Stambaugh (1961), Ph.D., *Professor of Forest Pathology*
 Dennis Keith Stanley (1961), Ph.D., *Associate Professor of Classical Studies*
 David C. Stark (1983), Ph.D., *Assistant Professor of Sociology*
 Charles Franklin Starmer, Jr. (1966), Ph.D., *Professor of Computer Science*
 Deborah A. Steege (1977), Ph.D., *Associate Professor of Biochemistry*
 David Curtis Steinmetz (1971), Th.D., *Professor of Church History and Doctrine*
 Daniel David Sternbach (1979), Ph.D., *Assistant Professor of Chemistry*
 Philip Stewart (1972), Ph.D., *Professor of Romance Languages*
 Donald E. Stone (1963), Ph.D., *Professor of Botany*
 Boyd R. Strain (1969), Ph.D., *Professor of Botany*
 Victor H. Strandberg (1966), Ph.D., *Professor of English*
 Harold Carl Strauss (1972), M.D., *Associate Professor of Pharmacology*
 Richard A. Strelitz (1984), Ph.D., *Adjunct Assistant Professor of Geology*
 Howard Austin Strobel (1948), Ph.D., *Professor of Chemistry*
 Ish Sud (1977), Ph.D., *Adjunct Associate Professor of Mechanical Engineering*
 J. Bolling Sullivan (1970), Ph.D., *Associate Professor of Biochemistry*
 John P. Sutherland (1969), Ph.D., *Associate Professor of Zoology*
 James A. Swenberg (1979), D.V.M., Ph.D., *Adjunct Associate Professor of Pathology*
 John Sylvester (1982), Ph.D., *Assistant Professor of Mathematics*

Avis L. Sylvia (1977), Ph.D., Associate Medical Research Professor of Physiology
 Charles Tanford (1960), Ph.D., James B. Duke Professor of Physiology
 George E. Tauchen (1977), Ph.D., Associate Professor of Economics
 *Kenneth Allen Taylor (1980), Ph.D. Assistant Medical Research Professor of Anatomy
 Robert Taylor (1983), Ph.D., Professor of Health Administration
 John J. TePaske (1967), Ph.D., Professor of History
 Marcel Tetel (1960), Ph.D., Professor of Romance Languages
 Jean-Jacques Thomas (1981), Doctorat de 3e Cycle, Associate Professor of Romance Languages
 Robert J. Thompson, Jr. (1984), Ph.D., Lecturer in Psychology
 Fredrick L. Thurstone (1967), Ph.D., Professor of Biomedical Engineering
 Edward A. Tiryakian (1965), Ph.D., Professor of Sociology
 R. Larry Todd (1978), Ph.D., Associate Professor of Music
 Robert E. Toomey (1980), LL.D., Adjunct Professor of Health Administration
 Marianna Torgovnick (1981), Ph.D., Assistant Professor of English
 Edward Tower (1974), Ph.D., Professor of Economics
 Vladimir G. Trembl (1967), Ph.D., Professor of Economics
 Kishor S. Trivedi (1975), Ph.D., Professor of Computer Science and Associate Professor of Electrical Engineering
 Michel-Rolph Trouillot (1984), Ph.D., Assistant Professor of Anthropology
 Anne S. Tsui (1981), Ph.D., Assistant Professor of Business Administration
 Vance Tucker (1964), Ph.D., Professor of Zoology
 E. Lee Tyrey (1970), Ph.D., Associate Professor of Anatomy
 Senol Utku (1970), Sc.D., Professor of Civil Engineering and Professor of Computer Science
 Marcy K. Uyenoyama (1982), Ph.D., Assistant Professor of Zoology
 Arturo Valenzuela (1970), Ph.D., Professor of Political Science
 J. Michael Vasievich (1977), Ph.D., Adjunct Assistant Professor of Forest Economics
 James W. Vaupel (1972), Ph.D., Associate Professor of Public Policy Studies and Associate Professor of Business Administration
 John M. Vernon (1966), Ph.D., Professor of Economics
 P. Aarne Vesilind (1970), Ph.D., Professor of Civil and Environmental Engineering
 Dan O. Via, Jr. (1984), Ph.D., Professor of New Testament
 Elia E. Villanueva (1969), A.M., Associate Professor of Physical Therapy
 W. Kip Viscusi (1981), Ph.D., Professor in Fuqua School of Business and Professor of Public Policy Studies
 Osvaldo Humberto Viveros (1977), M.D., Adjunct Associate Professor of Pharmacology
 F. Stephen Vogel (1961), M.D., Professor of Pathology
 Steven Vogel (1966), Ph.D., Professor of Zoology
 Robin T. Vollmer (1975), M.D., Assistant Clinical Professor of Pathology
 Olaf T. von Ramm (1974), Ph.D., Associate Professor of Biomedical Engineering
 Robert A. Wagner (1978), Ph.D., Associate Professor of Computer Science
 Geoffrey Wainwright (1983), Dr. Théol., Professor of Religion
 Stephen A. Wainwright (1964), Ph.D., Professor of Zoology
 William D. Walker (1971), Ph.D., Professor of Physics
 Andrew G. Wallace (1964), M.D., Assistant Professor of Physiology
 Thomas Dudley Wallace (1974), Ph.D., James B. Duke Professor of Economics
 Lise Wallach (1970), Ph.D., Lecturer in Psychology
 Michael A. Wallach (1962-72; 1973), Ph.D., Professor of Psychology
 Edward L. Walls, Jr. (1981), Ph.D., Adjunct Professor of Health Administration
 Richard L. Walter (1962), Ph.D., Professor of Physics
 Paul P. Wang (1968), Ph.D., Professor of Electrical Engineering
 Calvin L. Ward (1952), Ph.D., Professor of Zoology
 Frances Ellen Ward (1969), Ph.D., Professor of Immunology
 Robert E. Ward (1983), B.Mus., Visiting Mary Duke Biddle Professor of Music and Fellow of the Institute of the Arts
 Bruce W. Wardropper (1962), Ph.D., William Hanes Wannamaker Professor of Romance Languages
 Seth L. Warner (1955), Ph.D., Professor of Mathematics
 David Grant Warren (1975), J.D., Professor of Health Administration
 Katharine Way (1968), Ph.D., Adjunct Professor of Physics
 Robert E. Webster (1970), Ph.D., Professor of Biochemistry
 Andrew S. Wechsler (1974), M.D., Assistant Professor of Physiology
 Eliot Roy Weintraub (1970), Ph.D., Professor of Economics
 Morris Weisfeld (1967), Ph.D., Professor of Mathematics
 Henry R. Weller (1978), Ph.D., Professor of Physics
 Robert P. Weller (1980), Ph.D., Assistant Professor of Anthropology
 Richard L. Wells (1962), Ph.D., Professor of Chemistry

*Leave of absence, May 1, 1985, through October 31, 1985.

Sarah Westphal-Wihl (1983), Ph.D., Assistant Professor of Germanic Languages and Literature
 Robert W. Wheat (1958), Ph.D., Professor of Microbiology and Assistant Professor of Biochemistry
 Richard A. White (1963), Ph.D., Professor of Botany
 Richard Whorton (1979), Ph.D., Assistant Professor of Pharmacology
 Carol J. Wikstrand (1975), Ph.D., Assistant Medical Research Professor of Pathology
 Henry M. Wilbur (1973), Ph.D., Professor of Zoology
 Robert L. Wilbur (1957), Ph.D., Professor of Botany
 Pelham Wilder, Jr. (1949), Ph.D., Professor of Chemistry and Professor of Pharmacology
 William E. Wilkinson (1983), Ph.D., Associate Professor of Health Administration
 Hilda Pope Willett (1948), Ph.D., Professor of Bacteriology
 Brackette F. Williams (1983), Ph.D., Assistant Professor of Anthropology
 George W. Williams (1957), Ph.D., Professor of English
 Kenny J. Williams (1977), Ph.D., Professor of English
 William Hailey Willis (1963), Ph.D., Professor of Greek in Classical Studies
 James F. Wilson (1967), Ph.D., Professor of Civil Engineering
 John Wilson (1968), D.Phil., Associate Professor of Sociology
 Steven P. Wilson (1982), Ph.D., Assistant Medical Research Professor of Pharmacology
 Thomas George Wilson (1959), Sc.D., Professor of Electrical Engineering
 Wilkie Andrew Wilson, Jr. (1974), Ph.D., Associate Medical Research Professor of Pharmacology
 Robert G. Winfree (1974), M.A., Adjunct Assistant Professor of Health Administration
 Cliff W. Wing, Jr. (1965), Ph.D., Professor of Psychology
 Robert L. Winkler (1984), Ph.D., Professor of Business Administration
 Orval S. Wintermute (1958), Ph.D., Professor of Religion
 Ronald Witt (1971), Ph.D., Professor of History
 Benjamin Wittels (1961), M.D., Professor of Pathology
 Myron L. Wolbarsht (1968), Ph.D., Professor of Biomedical Engineering and Associate Professor of Physiology
 Robert L. Wolpert (1976), Ph.D., Assistant Professor of Mathematics
 Peter H. Wood (1975), Ph.D., Associate Professor of History
 Max A. Woodbury (1966), Ph.D., Professor of Computer Science
 Donald Wright (1967), Ph.D., Associate Professor of Mechanical Engineering
 Duncan Yaggy (1980), Ph.D., Professor of Public Management in Public Policy Studies and Adjunct Assistant Professor of Health Administration
 William E. Yarger (1971), M.D., Assistant Professor of Physiology
 William P. Yohe (1958), Ph.D., Professor of Economics
 James G. Yoho (1984), Ph.D., Research Professor of Forest Investment
 Charles R. Young (1954), Ph.D., Professor of History
 Franklin W. Young (1944-50; 1968), Ph.D., Amos Ragan Kearns Professor of New Testament and Patristic Studies
 John G. Younger (1974), Ph.D., Associate Professor of Classical Studies
 Allen Zagarell (1980), Ph.D., Assistant Professor of Anthropology
 Gary A. Zarkin (1982), Ph.D., Assistant Professor of Economics
 Peter Zwadyk, Jr. (1971), Ph.D., Associate Professor of Pathology

Emeriti Professors

John Richard Alden (1955), Ph.D., James B. Duke Professor Emeritus of History
 Lewis Edward Anderson (1936), Ph.D., Professor Emeritus of Botany
 Roger Fabian Anderson (1950), Ph.D., Professor Emeritus of Entomology
 Joseph Randle Bailey (1946), Ph.D., Professor Emeritus of Zoology
 Frank Baker (1960), Ph.D., Professor Emeritus of English Church History
 M. Margaret Ball (1963), Ph.D., Professor Emeritus of Political Science
 Katharine May Banham (1946), Ph.D., Associate Professor Emeritus of Psychology
 Frederick Bernheim (1930), Ph.D., James B. Duke Professor Emeritus of Pharmacology
 Mary L. C. Bernheim (1930), Ph.D., Professor Emeritus of Biochemistry
 William Dwight Billings (1952), Ph.D., James B. Duke Professor Emeritus of Botany
 Cazlyn Green Bookhout (1935), Ph.D., Professor Emeritus of Zoology
 Benjamin Boyce (1950), Ph.D., James B. Duke Professor Emeritus of English
 Charles Kilgo Bradsher (1939), Ph.D., James B. Duke Professor Emeritus of Chemistry
 Martin Bronfenbrenner (1971), Ph.D., William R. Kenan, Jr. Professor Emeritus of Economics
 Earl Ivan Brown II (1960), Ph.D., J. A. Jones Professor Emeritus of Civil Engineering
 Frances Campbell Brown (1931), Ph.D., Professor Emeritus of Chemistry
 Leonard Carlitz (1932), Ph.D., James B. Duke Professor Emeritus of Mathematics
 William H. Cartwright (1951), Ph.D., Professor Emeritus of Education
 Robert Taylor Cole (1935), Ph.D., James B. Duke Research Professor Emeritus of Political Science
 Robert Merle Colver (1953), Ed.D., Associate Professor Emeritus of Education
 Bingham Dai (1943), Ph.D., Professor Emeritus of Psychology

William D. Davies (1966), D.D., F.B.A., *George Washington Ivey Professor Emeritus of Advanced Studies and Research in Christian Origins*

Neal Dow (1934), Ph.D., *Professor Emeritus of Romance Languages*

Francis George Dressel (1929), Ph.D., *Professor Emeritus of Mathematics*

Kenneth Lindsay Duke (1940), Ph.D., *Associate Professor Emeritus of Anatomy*

Howard Easley (1930), Ph.D., *Associate Professor Emeritus of Education*

William Whitfield Elliott (1925), Ph.D., *Professor Emeritus of Mathematics*

John Wendell Everett (1932), Ph.D., *Professor Emeritus of Anatomy*

Arthur Bowles Ferguson (1939), Ph.D., *Professor Emeritus of History*

Wallace Fowlie (1964), Ph.D., *James B. Duke Professor Emeritus of Romance Languages*

John Hope Franklin (1981), Ph.D., *James B. Duke Professor Emeritus of History*

William J. Furbish (1954), M.S., *Associate Professor Emeritus of Geology*

Allan H. Gilbert (1920), Ph.D., *Professor Emeritus of English*

Clarence Gohdes (1930), Ph.D., *James B. Duke Professor Emeritus of English*

Walter Gordy (1946), Ph.D., *James B. Duke Professor Emeritus of Physics*

Paul M. Gross (1919), Ph.D., *William Howell Pegram Professor Emeritus of Chemistry*

Kazimierz Grzybowski (1967), S.J.D., *Professor Emeritus of Political Science*

Louise Hall (1931), Ph.D., *Professor Emeritus of Architecture*

John Hamilton Hallowell (1942), Ph.D., *James B. Duke Professor Emeritus of Political Science*

Jerome S. Harris (1936), M.D., *Professor Emeritus of Biochemistry*

William S. Heckscher (1966), Ph.D., *Benjamin N. Duke Professor Emeritus of Art*

Henry Hellmers (1965), Ph.D., *Professor Emeritus of Botany and Professor Emeritus of Forestry*

Marcus Edwin Hobbs (1935), Ph.D., *University Distinguished Service Professor Emeritus of Chemistry*

Everett H. Hopkins (1961), M.A., LL.D., *Professor Emeritus of Education*

Wanda S. Hunter (1947), Ph.D., *Associate Professor Emeritus of Zoology*

Allan S. Hurlburt (1956), Ph.D., *Professor Emeritus of Education*

Marianna Jenkins (1948), Ph.D., *Professor Emeritus of Art*

Bronislas de Leval Jezierski (1958), Ph.D., *Associate Professor Emeritus of Slavic Languages and Literatures*

Brady Rimbey Jordan (1927), Ph.D., *Professor Emeritus of Romance Languages*

Helen L. Kaiser (1943), R.P.T., *Professor Emeritus of Physical Therapy*

Van Leslie Kenyon, Jr. (1945), M.M.E., *Professor Emeritus of Mechanical Engineering and Materials Science*

Gregory A. Kimble (1952-68; 1977), Ph.D., *Professor Emeritus of Psychology*

Paul Jackson Kramer (1931), Ph.D., *James B. Duke Professor Emeritus of Botany*

Wladyslaw W. Kulski (1963), Ph.D., LL.D., *James B. Duke Professor Emeritus of Russian Affairs*

Weston LaBarre (1946), Ph.D., *James B. Duke Professor Emeritus of Anthropology*

H. Gregg Lewis (1975), Ph.D., *Professor Emeritus of Economics*

John L. Lievsay (1962), Ph.D., *James B. Duke Professor Emeritus of English*

L. Sigfred Linderoth, Jr. (1965), M.E., *Professor Emeritus of Mechanical Engineering*

John Nelson Macduff (1956), M.M.E., *Professor Emeritus of Mechanical Engineering*

Sidney David Markman (1947), Ph.D., *Professor Emeritus of Art History and Professor Emeritus of Archaeology*

Earl George Mueller (1945), Ph.D., *Professor Emeritus of Art*

Francis Joseph Murray (1960), Ph.D., *Professor Emeritus of Mathematics*

Aubrey Willard Naylor (1952), Ph.D., *James B. Duke Professor Emeritus of Botany*

Yasuhiko Nozaki (1966), Ph.D., *Associate Emeritus in Biochemistry*

James G. Osborne (1961), B.S., *Professor Emeritus of Forest Biometry*

Harold Talbot Parker (1939), Ph.D., *Professor Emeritus of History*

Lewis Patton (1926), Ph.D., *Professor Emeritus of English*

Ray C. Petry (1937), Ph.D., LL.D., *James B. Duke Professor Emeritus of Church History*

Olan Lee Petty (1952), Ph.D., *Professor Emeritus of Education*

Jane Philpott (1951), Ph.D., *Professor Emeritus of Botany and Professor Emeritus of Wood Anatomy*

Richard Lionel Predmore (1950), D.M.L., *Professor Emeritus of Romance Languages*

Richard A. Preston (1965), Ph.D., *William K. Boyd Professor Emeritus of History*

Theodore Ropp (1938), Ph.D., *Professor Emeritus of History*

Mabel F. Rudisill (1948), Ph.D., *Associate Professor Emeritus of Education*

Charles Richard Sanders (1937), Ph.D., *Professor Emeritus of English*

Lloyd Saville (1946), Ph.D., *Professor Emeritus of Economics*

William H. Simpson (1930), Ph.D., *Professor Emeritus of Political Science*

H. Shelton Smith (1931), Ph.D., *James B. Duke Professor Emeritus of American Religious Thought*

Joseph John Spengler (1934), Ph.D., *James B. Duke Professor Emeritus of Economics*

William Franklin Stinespring (1936), Ph.D., *Professor Emeritus of Old Testament and Semitics*

W. A. Stumpf (1948), Ph.D., *Professor Emeritus of Education*

Elizabeth Read Sunderland (1939-42; 1943), Ph.D., *Professor Emeritus of Art*

Edgar Tristram Thompson (1935), Ph.D., *Professor Emeritus of Sociology*

James Nardin Truesdale (1930), Ph.D., *Professor Emeritus of Greek*

Richard L. Tuthill (1953), Ed.D., *Professor Emeritus of Economic Geography*

Patrick R. Vincent (1954), Ph.D., *Associate Professor Emeritus of Romance Languages*

Warren Chase Vosburgh (1928), Ph.D., *Professor Emeritus of Chemistry*
Richard Lyness Watson, Jr. (1939), Ph.D., *Professor Emeritus of History*
Henry Weitz (1950), Ed.D., *Professor Emeritus of Education*
Bruce A. Wells (1964), M.S.E.E., *Associate Professor Emeritus of Electrical Engineering*
Paul Welsh (1948), Ph.D., *Professor Emeritus of Philosophy*
Karl Milton Wilbur (1946), Ph.D., *James B. Duke Professor Emeritus of Zoology*
Robert Hilliard Woody (1929), Ph.D., *Professor Emeritus of History*

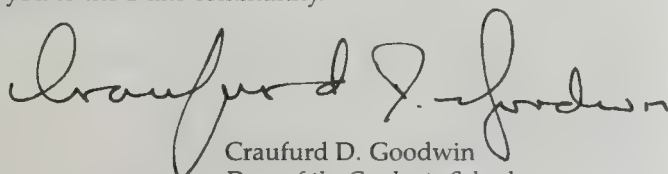


To the Prospective Graduate Student

From its beginning Duke University has maintained a first-rate Graduate School. This, we believe, is where excellence is established and where the two essential functions of a university, teaching and research, truly come together. Over the years Duke's strength at the graduate level has grown in all the main fields of knowledge. The faculty enjoys international distinction. The laboratories, libraries, and computer facilities are among the very best. Yet the Graduate School remains small enough so that personal contact is a central feature of our programs, and fruitful interaction across disciplines is a common experience.

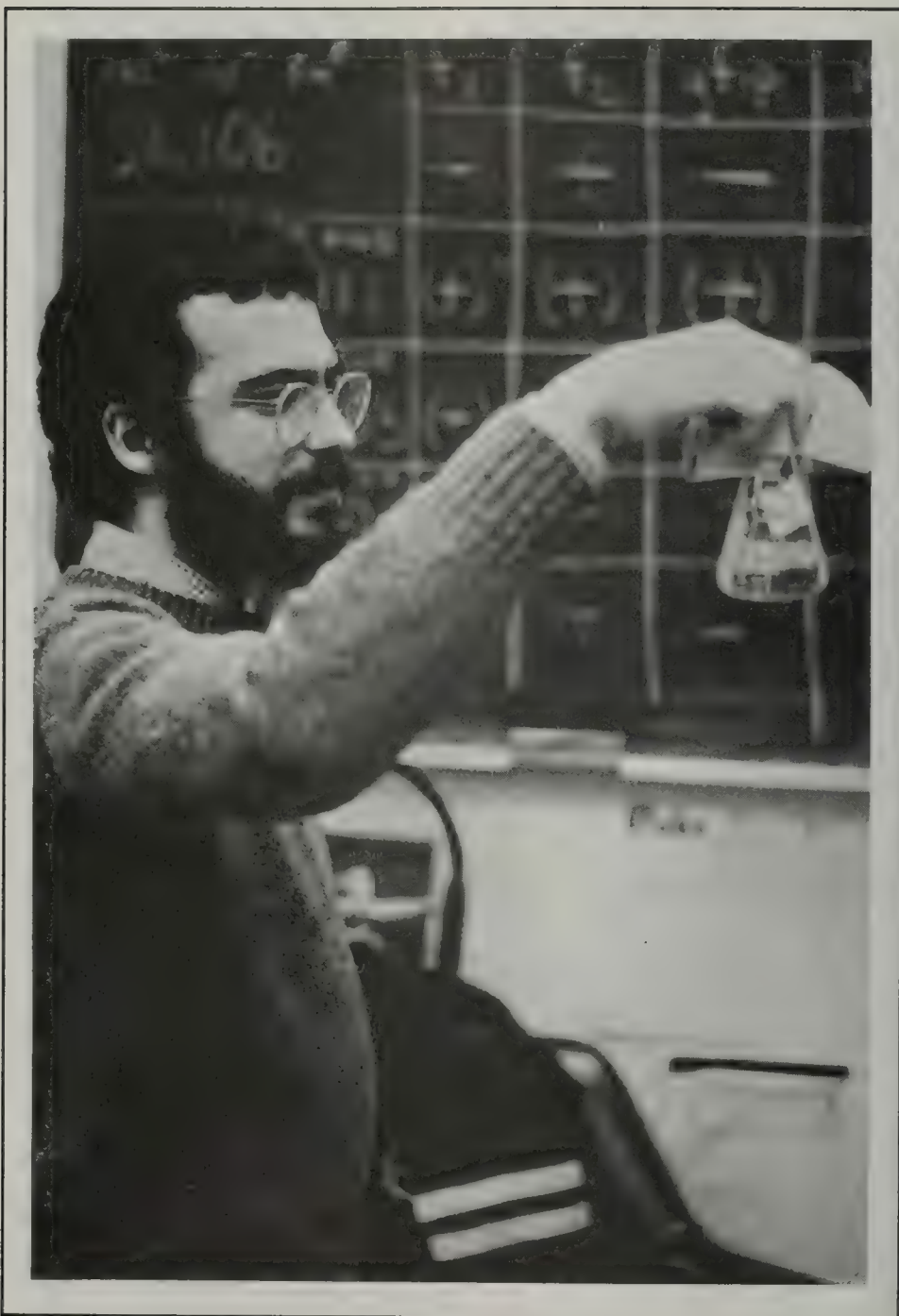
We are confident that for the student in search of a fine graduate education Duke University has much to offer. This is a community in which minds and ideas grow. We provide training for many careers, but we seek also to stimulate personal creativity and to provide congenial surroundings in which education and research are both productive and pleasant.

We hope that the following pages will provide you with the information you require in making the important choice of the course of your graduate education, and we look forward to welcoming you to the Duke community.



Craufurd D. Goodwin
Dean of the Graduate School

Program Information



Degrees Offered

The Graduate School of Duke University offers the following degrees: Master of Arts (A.M.), Master of Science (M.S.), Master of Health Administration (M.H.A.), and Doctor of Philosophy (Ph.D.).

The Master's Degrees

MASTER OF ARTS

The Master of Arts degree is offered in a broad range of fields, including art history, botany, classical studies, computer science, economics, English, German, history, humanities, liberal studies, mathematics, musicology, philosophy, political science, public policy, religion, romance languages, and sociology.

MASTER OF SCIENCE

The degree of Master of Science is offered in various areas including the following: botany, chemistry, forestry, geology, pathology, physical therapy, statistics and computing, and four fields of engineering—biomedical, civil and environmental, electrical, and mechanical and materials science.

MASTER OF HEALTH ADMINISTRATION

The Department of Health Administration offers a curriculum for graduate students interested in the field of health services management. It is designed primarily for students who hope to assume major leadership roles in a variety of organizations and programs that involve the provision of health services in public or private settings.

The Doctoral Degree

DOCTOR OF PHILOSOPHY

The Ph.D. degree is a research degree offered in thirty-three departmental and interdepartmental programs. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree. The granting of a Ph.D. degree is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

Special and Cooperative Programs



Center for the Study of Aging and Human Development

The primary aims of the center are to encourage and support basic and applied research on biomedical, behavioral, and social scientific aspects of adult development and aging; to train investigators for such research; to provide clinical training in geriatrics for health professionals; and to develop sources of scientific information which are accessible to interested individuals, organizations, and governmental agencies.

Although the center does not offer degrees, the varied programs, research laboratories, and clinical settings provide a context and resource for undergraduate and graduate students and for health professionals with special interests in adult development and aging. The center does conduct multidisciplinary, two-year programs for postdoctoral fellows interested in focused training for independent research on many varied aspects of aging and adult development. Through a program of seminars, collaboration with the senior fellows of the center, and independent research, postdoctoral fellows are able to choose and concentrate on selected issues of particular interest. Research methods, the development of specific research skills, and an interdisciplinary perspective are stressed. Resources of this all-University program include data from two longitudinal studies, a wide range of archival data of special interest to social scientists, an animal colony, and the center's basic and applied research laboratories. Undergraduate and graduate students of the University are welcome to inquire about participation in all programs at the center. A division of geriatrics coordinates research, training, and services related to the care of older adults.

Access to the faculties of medicine and arts and sciences is facilitated by a tradition of multidisciplinary research and a central location on campus. Inquiries should be addressed to the Director, Duke University Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, North Carolina 27710.

Asian-Pacific Studies Institute

The purpose of the Asian-Pacific Studies Institute is to encourage and support advanced training in Asian-Pacific studies and in Chinese, Japanese, and eventually other Asian-Pacific languages. The institute sponsors an agenda of visiting speakers and scholars and coordinates study abroad programs in China and Japan. A limited number of fellowships are granted which provide stipends for a two-year period. Fellows will be expected to reach the equivalent of third-year level of proficiency of language training during the term of their award. Incoming graduate students with the Ph.D. as their objective, students in good standing in the first year of study in

Duke professional schools, and current Duke students enrolled in Ph.D. programs may be considered for these fellowships. Further information may be obtained from the Asian-Pacific Studies Institute, 2111 Campus Drive, Duke University, Durham, North Carolina 27706.

Canadian Studies Program

The Canadian Studies Program was inaugurated in September, 1973. It is supported in part by grants from the U.S. Department of Education, the Andrew W. Mellon Foundation, and departments of Canada's provincial and national governments. Its purpose is to formalize and expand the interest of graduate students in Canada, to introduce the study of Canadian life and culture at the undergraduate level, and to encourage such study in primary and secondary schools. The program's basic aim is to increase knowledge and understanding of Canada at Duke and in North Carolina and other southern states.

The program awards a limited number of graduate fellowships and teaching assistantships for the study of Canada by American residents at Duke. Grantees must work on a Canadian dissertation topic within their disciplines. Grants of travel aid for field research in Canada are also offered.

The program sponsors lectures by Canadian specialists and supports seminars devoted to Canada. Occasionally, opportunities for study in Canada are offered to graduate students and faculty.

Inquiries should be addressed to the Director, Canadian Studies Center, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.

The University Program in Cell and Molecular Biology

This program centralizes the cell, developmental, and molecular biology research training found in eight of the University's departments: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. Prospective students may either apply to one of the participating departments, or apply directly to the program and designate a departmental preference. Applications for admission and fellowship support must be received by February 1, but early applications may receive earlier consideration.

Inquiries should be addressed to Dr. Bernard Kaufman, The University Program in Cell and Molecular Biology, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Continuing Education

Local adult residents are invited to apply for admission to pursue graduate study at Duke as nondegree students through the Office of Continuing Education, which will provide both academic and career counseling to such students. Information and continuing education applications may be obtained from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708. (See the chapter "Admission.")

Cooperative Programs with Neighboring Universities

Interchange of Registration. See the chapter "Registration and Regulations" for reciprocal agreements with neighboring universities.

Library Exchange. Through a cooperative lending program, graduate students of the University of North Carolina and Duke University are granted loan privileges in both universities.

Cooperative Program in Russian and East European Studies. The graduate schools of Duke University and the University of North Carolina offer a cooperative program leading to the A.M. and Ph.D. degrees in several disciplines (economics, history, literature, linguistics, political science, and sociology), with a concentration in Russian and East European studies. Students admitted to one institution are encouraged to enroll in courses advantageous to their programs at the other institution, and to utilize the libraries and facilities of both universities. The holdings of the two libraries in Russian and East European materials are substantial and complementary. Both libraries have a policy of purchasing all significant published works in Slavic history, economics, government, geography, literature, and linguistics. Other joint activities include periodic colloquia involving the personnel of the two institutions and distinguished visiting scholars.

A research program in Soviet economics (with special subjects such as input-output analysis and the "second economy") provides special training for graduate students in this field and publishes a series of monographs under several private foundation and government grants.

For more information, contact Professor Vladimir G. Treml, Department of Economics, Duke University, Durham, North Carolina 27706.

Center for Demographic Studies

The Population Studies Program was established at Duke University in 1963 to promote research and training in demography and human ecology. The program was renamed the Center for Demographic Studies in 1972 in recognition of its broad multidisciplinary focus and expanded research program. The facilities of the center, located at 2117 Campus Drive, include a population library, the Joseph J. Spengler Collection of publications and research materials, and extensive data resources. These are available to the entire Duke community.

The center does not offer degrees; it promotes the pursuit of advanced degrees, with a specialization in population studies, through either the Department of Sociology or the Department of Economics. The center's program provides opportunities for direct student participation in ongoing research projects. The program of extramural research stresses, but is not limited to, applied work in the demography of aging, health, mortality, fertility, and migration.

Inquiries for training opportunities may be directed to Dr. George C. Myers, Director, Center for Demographic Studies, Box 4732 Duke Station, Durham, North Carolina 27706.

Center for Environmental Engineering

The purposes of the Center for Environmental Engineering are to focus attention on pressing environmental problems, to provide orientation and educational opportunities in technical environmental subjects for both students and faculty, and to promote interdisciplinary environmental engineering research. The center sponsors a visiting speaker program, graduate and faculty seminars, and coordinates graduate and undergraduate courses in environmental engineering. Further information may be obtained by writing or visiting the Center for Environmental Engineering Office, 117D School of Engineering, Duke University, Durham, North Carolina 27706.

The University Program in Genetics

The University Program in Genetics was established to provide for the coherent development of instruction and research in genetics throughout the University. The faculty of the program consists of scientists holding primary appointments in several of the biological science departments (anatomy, biochemistry, botany, microbiology

and immunology, zoology.) They have developed an interdepartmental graduate curriculum designed to meet the needs of students with a variety of educational backgrounds and professional objectives. Students in any of the member departments may specialize in the discipline of genetics under the auspices of the University Program in Genetics. Interested students should apply for admission to the department of their choice, and after being admitted make arrangements to participate in the program.

For current information consult Professor J. Antonovics, Director, The University Program in Genetics, 132 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Master of Arts Program in Humanities

This interdepartmental program centered in the humanities and leading to the A.M. degree is designed for students whose interests cross disciplinary lines and are not easily met by departmental programs. Students select a set of thematically related courses from the graduate level offerings of humanities departments, and, where appropriate, from other departments as well. The interdepartmental committee which manages the program offers aid in tailoring a set of courses to the individual student's needs, approves the program chosen, and provides ongoing supervision.

Information on program requirements and admission may be found in the chapter "Courses of Instruction." Additional information may be obtained by writing the Director of Graduate Studies, Master of Arts Program in Humanities, The Graduate School, 127 Allen Building, Duke University, Durham, North Carolina 27706.

Indian Ocean Studies Program

Indian Ocean studies is a newly established program at Duke. Its purpose is to encourage both scholarly research and graduate training on the political, historical, economic, and sociocultural development of the countries of the region. The Indian Ocean region is defined as the littoral and island countries of South and East Africa, the Arabian peninsula and Persian Gulf, South and Southeast Asia, and Australia. The program also concerns itself with a number of adjacent countries which do not have coastlines directly on the Indian Ocean. The focus is upon this extensive area as a zone of intense human interaction, the impetus for which may have emerged from forces internal to cultures and societies within the region, or from the intrusion of external forces such as western colonialism and, more recently, military and economic power.

The program tries to encourage and to coordinate systematic training for graduate students in the culture, society, histories, and economies of the various countries and/or areas within the Indian Ocean world. Graduate students may also pursue comparative interests and themes (e.g., economic development, nationalism) through all or part of the region. The Departments of History, Anthropology, Political Science, Religion, Music, Sociology, and Civil and Environmental Engineering, among others, actively cooperate with the program.

Graduate students, in addition to meeting the requirements of the departments in which they are enrolled, are expected to take Hindi, Persian, Swahili, Arabic, or another Indian Ocean language appropriate to their research. Generally, field research which involves residence in an Indian Ocean country is expected for completion of the dissertation.

The University offers predoctoral graduate fellowships through the participating departments. Foreign students may be eligible to compete for two James B. Duke International Studies Fellowships awarded each year.

Through the Indian Ocean Studies Program the University supports and facilitates research by faculty and graduate students affiliated with the program. Research grants are also available from such organizations as the American Institute of Indian

Studies to which the University belongs. Library holdings for study and research on Indian Ocean countries are especially strong.

The program sponsors a regular agenda of visiting speakers and scholarly presentations in its faculty/graduate student seminar, in addition to special research symposia and conferences.

Inquiries should be addressed to the Chairman, Indian Ocean Studies Program, Center for International Studies, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.

Duke University International House

International House is the center of cocurricular programs for the more than three hundred students from seventy-two countries, as well as for American students who are interested in other cultures, or are considering travel or study outside the United States. The International Association, which includes a significant number of American members, plans social and cultural programs which emphasize personal contact and the informal exchange of ideas among students from diverse backgrounds. Included are weekly open-houses with lectures, films, pot-luck dinners, or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area.

Programs which assist students from abroad in participating in the life of the Durham and Duke communities include an intensive orientation program at the beginning of the academic year; the Host Family Program, in which interested international students may become acquainted with American families; the International Wives Club, which provides a structure for international women to meet with American women in an informal atmosphere; and the Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community.

The Director of International House also serves as International Adviser. The director and an assistant work with students from abroad in fulfilling the various immigration and tax formalities involved in coming to Duke. Their office is located on the second floor of International House.

Additional information may be obtained by writing to Dr. Brian Q. Silver, Director, International House, 2022 Campus Drive, Duke University, Durham, North Carolina 27706.

Islamic and Arabian Development Studies

A program in Islamic and Arabian Development Studies was established in 1977 with the assistance of grants from the government of Saudi Arabia and some twenty corporations in the United States. The program sponsors research on Islamic themes with special reference to developmental problems of the Arabian peninsula and supports an undergraduate course in Islamic civilization and an interdepartmental senior-graduate seminar in contemporary problems of development in the Islamic world. In 1979 the program sponsored an international conference at Duke and in 1982 held a second international conference on Kiawah Island, South Carolina. Smaller conferences are held at Duke from time to time; in 1982 there was a conference on security problems of the Arabian peninsula and seminars in calligraphy, illumination, and art of the *Qur'ān* and philosophical issues in Islam.

The program sponsors a student delegation to the annual Model Assembly of the League of Arab States in Washington, D.C. The 1984 delegation won the highest number of awards given to any participating university. Twelve faculty members from outreach colleges were awarded fellowships for study in Cairo and six Duke faculty were given fellowships for study in Jordan in 1984. The program was the recipient of a bequest by the late Joseph J. Malone of his library in Arabian affairs. Other grants

make possible renovation of a room to house what will be known as the Malone Collection.

The program provides a limited number of graduate fellowships and supports the teaching of three years of Arabic and a course in contemporary Arab literature in translation. It also sponsors an outreach program which includes Appalachian State University, Belmont Abbey College, the College of Charleston, Converse College, Davidson College, Johnson C. Smith University, Old Dominion University, and the University of the South. A summer program for college teachers was conducted in 1981, and colloquia for college teachers are held annually.

Inquiries should be addressed to Dr. Ralph Braibanti, Director, Islamic and Arabian Development Studies, 2114 Campus Drive, Duke University, Durham, North Carolina 27706.

Latin American Studies Program

The Graduate School offers an interdepartmental program in Latin American studies in conjunction with several departments. Students apply to the Departments of Anthropology, History, Economics, Political Science, Sociology or Romance Languages, fulfilling the requirements of those departments and writing their A.M. and Ph.D. degrees under their auspices. In consultation with the candidate, a faculty committee will determine a special program of study giving the candidate rigorous training in the Latin American field in addition to their disciplinary training.

The holdings of the Perkins Library for graduate work and research in Latin-American history, inter-American relations, economic history, politics, art, and Spanish-American literature are constantly being enlarged. Program faculty are involved in different national research programs dealing with Latin American topics and offer advice on fellowship support for graduate research in Latin America and the Caribbean. Inquiries should be directed to Dr. Arturo A. Valenzuela, Chairman, Council on Latin American Studies, Center for International Studies, 2101 Campus Drive, Duke University, Durham, North Carolina 27706.

Master of Arts in Liberal Studies

The Master of Arts in Liberal Studies is an interdisciplinary program that allows individuals with a variety of professional and personal educational interests the flexibility to pursue their interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students will study primarily on a part-time basis and will choose from an array of interdisciplinary courses developed specifically for this program. In addition, the students will select other graduate-level courses that fit their individual needs and interests.

For further information, call or write Dr. Bonnie Erickson, Director, Master of Arts in Liberal Studies Program, Room 122 Allen Building, Duke University, Durham, North Carolina 27706, (919) 684-3222.

The Ph.D. Program in Literature

The Ph.D. Program in Literature offers to qualified students the possibility of gaining unusually broad credentials with which to embark on a teaching career in established national literatures as well as programs linking literature to other fields. Study in depth through courses in a single national literature is combined with a series of four core courses, given in a two-year sequence, on the fundamental issues of literary theory, history, and criticism. The two-year program of courses is given focus and depth by a careful and continuous advising system, and by a tutorial requirement which prepares students in the skills and habits of advanced research. Normally, a

student entering the program will work out a coherent but modifiable personal sequence of courses with a single general field of study in mind, for example, the Renaissance, romanticism, tragedy, or modern transformations of mythology. These courses will be centered in a single national literature but students will be encouraged to explore a second or third national literature or related discipline in the humanities, such as philosophy or art history. All the literature departments cooperate in this program and its students have access to all courses given under the auspices of the graduate faculties in the humanities.

The program is managed by a committee which advises students, directs their course of study, and prepares their preliminary examinations in cooperation with the department of the national literature elected for primary study by program participants. A faculty of seventeen, drawn from all literature departments, is involved in the teaching of the program's core courses, which deploy the team-teaching method in order to make full use of faculty expertise.

Financial aid is available for qualified students. Teaching experience is essential to the program and the opportunity to teach is normally available by the third year of graduate study. A full descriptive brochure is available. To obtain the brochure or other information, please direct all inquiries to Professor James Rolleston, Chairman, Committee for the Ph.D. in Literature, Department of Germanic Languages and Literature, 104 Language Building, Duke University, Durham, North Carolina 27706.

Medical Historian Training Program

The Medical Historian Training Program is conducted under the auspices of the School of Medicine and the Graduate School. The M.D.-Ph.D. program requires a minimum of six years of graduate study, and the M.D.-A.M. four or five years, depending on the use of summer terms. The M.D.-Ph.D. program is intended for those students who know that their major career effort will be in teaching and other scholarly activities in the history of medicine (not necessarily to the total exclusion of clinical medicine). The M.D.-A.M., on the other hand, is appropriate for those who are undecided, but who wish to acquire a firm foundation for future study. It is also appropriate for those who are seriously interested in pursuing an avocation in the history of medicine. In both programs the first two years and the last year will be spent in the medical school. All requirements for the Ph.D. and the A.M. must be completed before the final year of the M.D. program.

Application and Admission Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Candidates who have completed two years of medical school will also be considered.

In addition to the minimum requirements established by the School of Medicine and the Graduate School, courses already taken in history and the history and philosophy of science will count in the selection of candidates. Those candidates holding the M.D. degree are accepted for the Ph.D. and the A.M. degrees.

Applicants should complete and submit an application to the Graduate School for admission to the Department of History.

Additional information may be obtained by writing to Dr. John Crellin, Director, Medical Historian Training Program, Box 3702, Duke University Medical Center, Durham, North Carolina 27710.

Medical Scientist Training Program

The Medical Scientist Training Program, conducted under the auspices of the Graduate School and the School of Medicine, is designed for students with a strong background in science who are motivated toward a career in the medical sciences and

academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the clinical curriculum of the School of Medicine. The program usually requires six to seven years of study and leads to both the M.D. and Ph.D. degrees. Although the special emphasis of this program is on basic medical science, the trainees, because of their education in clinical medicine, have a remarkable range of career opportunities open to them. Graduates of this program generally follow one of two broad paths. Some directly pursue careers in teaching and research in one of the basic medical sciences, while maintaining strong ties with clinical science as a result of their combined training; others enter residency programs before pursuing investigative and teaching careers in clinical medicine, carrying with them strong academic backgrounds in the basic sciences.

Eligibility. Applicants must meet the admission requirements of both the Graduate School as a candidate for the Ph.D. degree and the School of Medicine as a candidate for the M.D. degree. Most candidates apply for admission to the first year of the program, but applications are sometimes accepted from students who are enrolled in appropriate stages of their curriculum in the Graduate School or School of Medicine of Duke University. In addition to the minimum requirements for acceptance in the Graduate School and the School of Medicine, advanced course work in science and mathematics as well as prior research experience count heavily in the selection of candidates.

Financial Support. Students admitted to the first year of the program in 1985 can receive a traineeship award, consisting of a stipend and full tuition allowance, provided by a grant from the National Institutes of Health. The present annual stipend is \$5,290. Current policy of the National Institutes of Health limits the duration of the traineeship to six years, but the years need not be consecutive; this permits curricula which take more than six years.

This traineeship, created by the National Research Service Award Act of 1974 (PL 93-348) provides (as do all research training awards under this act) for certain alternate service or payback requirements in the event that a research career is not pursued. Support by the NIH under the National Research Service Award Act requires the recipient to be a citizen or resident of the United States.

The Training Program. This program has been designed to offer trainees latitude in the selection of course material. Basic requirements are two academic years composed of the first basic science year and the second clinical science year of the curriculum for medical students at Duke University. Following completion of the second year, the trainee enters the graduate program to complete the requirements for the Ph.D. degree. A final academic year of elective clinical study is necessary to complete the requirements for the M.D. degree. Both degrees are awarded at the completion of this sequence.

Additional information may be obtained by writing Professor Henry Kamin, Associate Director, Medical Scientist Training Program, Department of Biochemistry, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Program in Medieval and Renaissance Studies

The graduate Program in Medieval and Renaissance Studies is administered by the Duke University Center for Medieval and Renaissance Studies. A participating student is based in one of the regular departments and fulfills the Ph.D. degree requirements for that discipline. In addition, students take a program of electives which will advance their interdisciplinary competence in the medieval or Renaissance areas. Such a program may include a choice from the fields of art history, language and literature, history, philosophy, and religion. Participation in the Program in Medieval and Renaissance Studies will fulfill the requirement for work in a related field.

The Center for Medieval and Renaissance Studies awards annual fellowships to outstanding doctoral students. Each fellowship is renewable twice, with renewal based on a review of the student's program by a committee.

The Center for Medieval and Renaissance Studies also sponsors an undergraduate program, the *Journal of Medieval and Renaissance Studies*, a monograph series in the field, and lectures by distinguished visiting scholars.

Inquiries should be addressed to the Director of Graduate Studies, Duke University Center for Medieval and Renaissance Studies, Box 4666, Duke Station, Durham, North Carolina 27706.

The University Program in Neurobiology

Recent advances in neurobiology have resulted in such new methods as immunohistochemistry and in closer ties among the various approaches to studying the nervous system. For example, research on the neuroanatomical basis of behavior is more dependent than ever before on the chemical and cellular study of neurons. To keep pace with these changes a new program has been designed for a small number of students who wish to study the nervous system at several levels ranging from the molecular to the behavioral. In planning course work, each student will be guided by an advisory committee whose members come from a variety of departments. All students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Each student must affiliate with one of the participating departments—anatomy, biochemistry, microbiology and immunology, pathology, pharmacology, physiology, psychology, and zoology—and must meet all the requirements of that department for the Ph.D. degree. Normally, the dissertation adviser and the student will be members of the same department.

Prospective students should apply directly to one of the eight participating departments, and should indicate on the application their interest in the University Program in Neurobiology. Applicants will be selected on the basis of their overall academic excellence, their promise for research, and their proficiency in the biological, behavioral, and physical sciences. Applications for admission and fellowship support must be received by February 1.

Inquiries should be directed to Professor Irving T. Diamond, Director, University Program in Neurobiology, Department of Psychology, Duke University, Durham, North Carolina 27706.

Oak Ridge Associated Universities

Duke University is one of the sponsoring universities of the Oak Ridge Associated Universities located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge. Fellowships in several fields of science are available to qualified applicants.

Graduate Fellowship Program. On application by a university, ORAU awards fellowships to candidates for the master's and doctor's degrees. The student uses the fellowship to conduct thesis research in certain federal laboratories.

The application deadlines depend upon the fellowship. Further information may be obtained from Dr. Harold W. Lewis, Department of Physics, Duke University, Durham, North Carolina 27706.

Institute of Policy Sciences and Public Affairs

The graduate program in public policy studies is offered through the Institute of Policy Sciences and Public Affairs. The objective of the program is to prepare students



for jobs, particularly in the public sector, which require analytical skills and a practical understanding of the processes by which policy is made and implemented.

The A.M. degree requires two academic years and a summer internship. The first year is devoted to core courses in policy analysis, including sequences in quantitative methods, economics, political analysis, and ethics. The summer internship is arranged with a federal, state or local agency. The second-year curriculum includes course work in public management and macroeconomics, a concentration in a substantive policy area, and a masters "memo" to be researched and written on a problem of current policy concern.

Students who are concurrently enrolled in a Ph.D. program or a professional degree program (M.D., J.D., M.B.A., M.H.A., etc.), or who have already obtained such a degree, can apply for an abbreviated version of the A.M. program. Such students are excused from most second-year requirements, so ordinarily the A.M. in Public Policy can be completed in one additional year. Students usually apply for a joint degree program simultaneously with their applications to the graduate departments or professional schools, or during their first or second year of advanced study.

The institute does not award a Ph.D.

More information concerning the A.M. programs can be obtained by writing the Director of Graduate Studies, Institute of Policy Sciences and Public Affairs, Duke University, Durham, North Carolina 27706.

Center for Resource and Environmental Policy Research

The Center for Resource and Environmental Policy Research at Duke University is committed to the study of public policies on natural resources and the environment. Housed in the School of Forestry and Environmental Studies and initially supported by the Andrew W. Mellon Foundation, the center combines the efforts of a small permanent faculty with participation by business leaders, government officials, and the faculty and students of Duke University and other universities to provide a center of excellence for the analysis of contemporary resource and environmental policy issues. The center offers a forum for the examination of public and private responsibilities for natural resources and the environment and provides a means to link the specialized knowledge of academia with the information needs of government and industry.

Graduate research assistantships are offered to qualified students researching resource and environmental policy problems. Support is available to students pursuing M.S., A.M., or Ph.D. degrees through the Graduate School at Duke University and in conjunction with the School of Forestry and Environmental Studies or other departments. Course work is offered in both intensive and semester-long formats. Intensive courses lasting from one to three weeks are designed primarily for mid-career professionals seeking supplementary course work, certificates of achievement, or advanced degrees. Semester-long courses at the center are designed primarily for full-time students desiring a strong conceptual foundation in resource and environmental policy analysis.

For further information, write to Dean Benjamin A. Jayne, Center for Resource and Environmental Policy Research, 102 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Short Courses and Conferences

Short courses, institutes, and training programs are conducted throughout the year by the Office of Continuing Education. Some are residential, others are designed for local participants; some carry academic credit, others award continuing education units (CEU); still others are noncredit. Previous programs have included Federal Regulations, Writers' Conferences, Energy Conservation in Buildings, School Manage-

ment, Product Safety, the Computer Camp, and the Summer Institute of Alcohol Studies. Contact Dr. Judith Ruderman, Director, Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708, for brochures describing current offerings and for assistance in developing programs.

Duke Summer Festival of Creative Arts

The Duke Summer Festival of Creative Arts is a part of the Summer Session and an extension of the function of the Office of Cultural Affairs, coordinating the arts in the summer and providing an exciting, artistically stimulating environment for the campus and community. During the summer, it is possible to offer new and innovative courses and workshops. Distinguished artists and scholars will be involved in cocurricular sessions. Students will have opportunities to try their wings in formal and informal productions.

Information may be obtained by writing Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706.

Summer Drama Program. The Duke University Drama Program, which began its course offerings in the summer of 1974, strives to make its summer offerings particularly exciting and innovative. The undergraduate course offerings and the production program of Summer Theatre at Duke offer the theater-oriented student an integrated program of training in practical theater and dramatic literature during the first summer term.

Detailed information on faculty, courses, productions, and auditions may be obtained by writing to Summer Drama Program, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

Summer Theatre at Duke. Founded in 1972, Summer Theatre at Duke has become an eagerly awaited series of exciting theatrical events. The repertory is chosen from the best in modern theater and musical comedy with an occasional new look at a classic. The casts are selected on the basis of auditions held during late spring. Four professional guest artists will headline casts of student and local talent. Direction and design are provided by the professional staff of the Duke University Drama Program.

For its fourteenth season, Summer Theatre at Duke will offer three major productions and several special events during June and July, 1985. The repertory and ticket information will be announced in late spring.

For further information, write to Summer Theatre, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

The American Dance Festival. The six-week program offers a wide variety of classes, performances, and workshops. For a catalog, write to the American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

The University Program in Toxicology

This interdepartmental program provides graduate students and postdoctoral fellows an opportunity for a strong interdisciplinary education in toxicology through support of courses, seminars, and research. With recognition of the impact of toxic reactions on the public health and ecological systems, toxicology is of increasing significance to public policy areas. The objectives of program members are to understand and devise controls for those toxicological phenomena having direct pertinence to human life and health, to train scholars who will advance the science of this discipline, and to provide a forum for faculty and student discussion of recent research developments in the area.

The faculty of the toxicology program is drawn from anatomy, biochemistry, chemistry, forestry and environmental studies, microbiology and immunology, pa-

thology, pharmacology, physiology, zoology, and several departments in the School of Medicine. Current areas of research include pulmonary toxicology, neurotoxicology, immunotoxicology, carcinogenesis, and biochemical toxicology. Students may base their training in general toxicology, ecotoxicology, or in any area in which the faculty is currently involved. Prospective graduate students may apply to the program directly or to one of the participating Graduate School departments, and must be admitted to the department and to the program. Students will be expected to fulfill departmental Ph.D. degree requirements as well as toxicology program requirements.

Information on fellowship support and application procedures may be obtained from Dr. William S. Lynn, Director, University Program in Toxicology, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Organization for Tropical Studies

Duke University is a member of an international consortium created to promote an understanding of tropical environments through research and research training programs in the tropics. The basic OTS course, *Tropical Biology: An Ecological Approach* (8 units), extends for an eight-week period in January-March and in July-August. Advanced offerings are scheduled periodically in agriculture, anthropology, botany, earth sciences, forestry, geography, marine biology, meteorology, and zoology.

The application deadlines are March 1 and October 1. Fellowship applications for travel and subsistence in the field-oriented programs conducted in Costa Rica are available through the faculty representatives. Consult Dr. Donald Stone (botany), Dr. Richard White (botany), or Dr. John Lundberg (zoology) for information.

Resources for Study



The Libraries

The libraries of the University consist of the William R. Perkins Library and its seven branches on campus (Biology-Forestry, Chemistry, Divinity, East Campus, Engineering, Music, and Physics-Math); the Undergraduate Library; the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort; the Fuqua School of Business Library; the School of Law Library; and the Medical Center Library. In June 1983, these libraries contained approximately 3,300,000 volumes and ranked nineteenth in size among academic libraries in the United States. Approximately 10,300 periodicals, 11,300 serials, and 166 newspapers are received regularly. The collection includes about 7,450,000 manuscripts, 82,000 maps, 39,000 music scores, and 651,000 items in microform.

In addition to noteworthy holdings in British history, English literature, American history and literature, Commonwealth studies, Latin American history, religion, and science, the libraries include several distinguished special collections of international reputation such as the George Washington Flowers Collection of Southern Americana, the Baker Collection of Wesleyana and British Methodistica, the Mazzoni Collection of Italian Literature, the Perez de Velasco Collection of Latin American History, the Jantz Collection of German Baroque Literature and German Americana, the Trent Collection of Walt Whitman, the Trent Collection in the History of Medicine, and the Strisower Collection of International Law.

THE WILLIAM R. PERKINS LIBRARY

Collections. The William R. Perkins Library, the main library of the University, houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The newspaper collection, with nearly 50,000 reels of microfilm and several thousand bound volumes, has long eighteenth-century files; strong holdings of nineteenth-century New England papers; antebellum and Civil War papers of North Carolina, South Carolina, and Virginia; and many European and Latin American papers. The manuscript collection of approximately 7,450,000 items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region and includes significant papers in English and American literature. The collection in the Rare Book Room contains scarce and valuable materials covering a broad range of fields. The Latin and Greek manuscript collection constitutes one of the outstanding

groups of its kind in the United States. The collection of Confederate imprints is the largest in the country.

The branch libraries serve the academic disciplines bearing their names. The East Campus Library is primarily for undergraduate use; however, it also contains the principal collections for graduate and undergraduate study in art.

Reference Services. Professional reference service is available to faculty and students in all campus libraries. Reference librarians are on duty in Perkins Library for most of the hours the library is open. Their primary responsibility is to assist patrons in making the most effective use of library collections and facilities. In addition to answering specific questions, the reference librarians also help patrons access information by identifying and explaining the use of library sources and by giving formal and informal library instruction to groups of students, faculty, or staff.

Control Desk. To protect the collections of Perkins Library for the benefit of all members of the University community, an electronic security system is in operation at the main exit. Desk attendants are stationed at the library's principal exit and are authorized to examine all books and other library materials that people leaving the library may be carrying to determine if they are properly charged. Anyone who refuses to permit books to be examined may be denied further use of the library.

Library Carrels. A limited number of closed and open carrels are available in the various libraries. Assignments ordinarily are made for the academic year. Graduate students may apply for a carrel through the circulation department in Perkins Library.

Interlibrary Loans and the Libraries of the University of North Carolina. The Duke University library provides the usual interlibrary loan services. Graduate students may borrow directly from the libraries on the four University of North Carolina campuses at Chapel Hill, Raleigh, Greensboro, and Charlotte after acquiring a Duke-UNC cooperative library privilege card from the circulation department of the Perkins Library. There is regular delivery service between the Duke University library and the libraries of the University of North Carolina at Chapel Hill and North Carolina State University at Raleigh.

Reproduction of Library Materials. The library has microfilming and copy services. The rules with regard to copyright and a schedule of fees for reproduction services are available in the library at the point of service.

THE MEDICAL CENTER LIBRARY

The Medical Center Library, located in the Seeley G. Mudd Communications Center and Library Building on the Medical Campus, provides services and informational resources necessary to further education, research, and clinical activities in the medical field. In addition to the faculties and students in the Schools of Medicine, Allied Health, and Medical Center graduate departments, the library serves the professional and technical staffs of Duke Hospital as well as other health professionals throughout North Carolina. Over 205,000 volumes are available; approximately 2,650 journal subscriptions are received currently. Professional reference librarians are available for assistance in the use of library resources, and arrangements may be made for individual or group tours, instruction, or specialized seminars.

The History of Medicine Collections, including the Josiah C. Trent Collection, consist of rare books and manuscripts and a supporting group of histories, biographies, bibliographies, pictures, and ephemeral materials. The rare books are available to all, but are restricted to library use. Most modern books may be borrowed. The History of Medicine Collections also include the Duke Authors Collection, which preserves an archival copy of each book published by a member of the Duke medical faculty.

The Frank Engel Memorial Collection consists of a small group of books for leisure reading in nonmedical subjects, supplemented by several newspapers and popular magazines.

A reserve collection of heavily used books and journals is maintained in the Medical Sciences Branch Library located in the Nanaline Duke Building and covers the fields of biochemistry, genetics, pharmacology, and physiology.

THE SCHOOL OF LAW LIBRARY

The School of Law Library, with over 340,000 volumes, serves both the University and the local legal community. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. A large section of the library collection is devoted to treatises on all phases of law and legal sciences, as well as history, economics, government, and other social and behavioral sciences relevant to legal research. The treatises are organized in the Library of Congress classification system and are accessible through a public catalog. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. The library receives the records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, and the North Carolina Supreme Court and Court of Appeals. In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics. Undergraduate and graduate students whose course of study requires access to legal literature may use the library. However, access to the library may be restricted during certain times because of accreditation standards.

RECORD LIBRARY

The Department of Music has a record library separate from the university libraries with facilities for listening to records and tapes. While all materials may be used in the listening room, recordings from the departmental collection may be borrowed only by faculty of the Department of Music. Any member of the community may borrow from the Arts Council Collection of more than 2,400 records for a nominal fee.

UNIVERSITY ARCHIVES

The Duke University Archives, the official archival agency of the University, collects, preserves, and administers the records of the University having continuing administrative or historical value. The institutional archives, which also include published material, photographs, papers of student groups and faculty, and selected memorabilia, are available for research under controlled conditions in 341 Perkins Library.

Science Laboratories

Computation Center. Extensive computer resources are essential for a contemporary university. Computing is provided at Duke by the Duke University Computation Center (DUCC). The center presently maintains an IBM 3083 System Complex with eight megabytes of memory, eight IBM 3380 disk drives, eight IBM 3350 disk

drives, four IBM 3330-11 disk drives, six IBM 3420 tape drives, one Xerox 8700 laser printer, three IBM high-speed printers, a CalComp digital plotter, and an IBM 2540 card reader/punch. The DUCC facility is connected by a high-speed microwave to the Triangle Universities Computation Center (TUCC) located in the Research Triangle Park.

TUCC is a regional computer network formed and operated jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. The computer equipment at TUCC consists of one IBM 3081 with twenty-four million bytes of memory, one IBM 370 Model 168 with eight million bytes of memory, multiple 3330- and 3350-type disk drives, thirteen tape drives, card readers, and printers. Also available is a small Hewlett-Packard 2000 Access computer which provides BASIC interactive computing.

Duke's IBM 3083 is used mostly for administrative computing and as a high-speed link to TUCC. Also connected to TUCC are four medium-speed printers located in the Engineering Building, the Biological Sciences Building, the Sociology-Psychology Building, and West Duke Building on East Campus, as well as seven low-speed keyboard terminal clusters located at various points around the University. Five clusters and two laboratories of IBM personal computers are also available. The laboratories are located in the Engineering Building and in North Building.

All users of the Computation Center facilities are urged to obtain funds to pay for computer services. Users unable to obtain grant funding may ask for financial support from their departments when applying for services. More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center.

Botanical and Zoological Laboratories. Facilities for graduate study in the Departments of Botany and Zoology are located on the West Campus. The Biological Sciences Building contains well-equipped modern laboratories for teaching and research in the fields of botany, forestry, and zoology. Special facilities include animal rooms, greenhouses, darkrooms, refrigerated and controlled-environment laboratories, scanning and transmission electron microscopes, a Van de Graaf accelerator, X-ray machines, radiation and radioisotope equipment, and other modern research facilities. Extensive facilities for experimentation in environmental control of plant growth are available in the phytotron adjacent to the botany greenhouses.

The herbarium contains over 500,000 specimens and includes notable collections of mosses and lichens. Other assets for teaching and research are the Sarah P. Duke Gardens on the West Campus; the 11-acre experimental plot and field laboratory developed by the Department of Botany; the Duke Forest, comprising 8,300 acres of woodland adjacent to the West Campus; the field station for the study of animal behavior and ecology; and the Duke University Marine Laboratory, an interdepartmental facility located on a small island on the coast at Beaufort, North Carolina, where twenty-two buildings and a small flotilla of ships and boats provide teaching and research facilities for resident graduate students and faculty as well as visiting individuals or groups.

Duke University, through the botany and zoology departments, is a member institution of the Organization for Tropical Studies, Inc., a consortium of universities with field station facilities in Costa Rica that provide opportunities for course work and research in tropical science.

Highlands Biological Station. Duke University holds a contributing membership in the Highlands Biological Station at Highlands, North Carolina, on the southern edge of the Blue Ridge Mountains at an elevation of 4,118 feet. The situation and the region offer an excellent opportunity for field studies and some laboratory work. A limited number of qualified students in botany and zoology may make arrangements

to carry out research here. Scholarships for advanced study during the summer months are available through the station.

For further information contact Dr. M. D. Rausher, Department of Zoology, or Dr. N. L. Christensen, Department of Botany, Duke University, Durham, North Carolina 27706.

The Phytotron. The phytotron, a national environmental control facility operated for the National Science Foundation, is adjacent to the Biological Sciences Building and is administered by the botany department. The phytotron is an integrated series of plant-growth rooms, chambers, and greenhouses, with forty-six separately controlled environments providing more than 4,000 square feet of plant-growing space. The factors of the environment controlled in the units to study plant growth include light, temperature, nutrients, carbon dioxide concentration, and humidity. By using the conditions in various day and night combinations, an exceptionally large number of environments can be simulated for testing the growth responses of plants. The phytotron also includes research laboratories and facilities for studying and monitoring the physiological processes of plants.

Research space in the phytotron is available to graduate students and faculty at Duke and to members of other educational and research organizations. For information concerning the rental of research space, contact Dr. Boyd R. Strain, Director of the Phytotron, Department of Botany, Duke University, Durham, North Carolina 27706.

Duke Forest. The Duke Forest comprises approximately 8,300 acres of land in five major divisions and several smaller tracts. A ten-minute walk from campus will take one well into many parts of the Durham Division, and a network of roads and fire trails make almost all areas of the forest easily accessible.

The forest lies primarily in Durham and Orange counties, near the eastern edge of the piedmont plateau, and supports a cross-section of the woodlands found in the upper coastal plain and lower piedmont of the Southeast. A variety of timber types, plant species, soils, topography, and past land use conditions are represented. Elevations range from 260 to 760 feet. Soils of the region are derived from such diverse parent materials as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives.

The Duke Forest, as it is known today, had its origins in the mid-1920s when the University administration bought many small farms and interspersed forest land as buffer areas for the main campus and as an investment for the future. The forest was placed under intensive management in 1931 by Dr. Clarence Korstian, its first Director. In its early development, several basic objectives were emphasized: (1) demonstration of timber management techniques on a practical and economic basis, (2) development of an experimental forest for research in the sciences associated with timber growing, and (3) development of the area as an outdoor laboratory for students of forestry. In recent years, there has been increased interest and dependence on the forest for research in such areas as zoology, botany, and ecology by faculty and students at Duke and neighboring universities. Background information useful to researchers covers such features as soils, topography, inventory, plantation and cultural records, as well as a bibliography of past and current studies. Current work on problems associated with developmental pressures at the urban-rural interface and integrated approaches to natural resource management have multiplied the value and benefit of the forest.

The forest also serves in an educational and recreational capacity for residents of the Durham and Chapel Hill communities. Hiking, picnicking, jogging, and nature study are particularly popular pastimes.

This natural outdoor laboratory is an invaluable supplement to the instructional, research, and recreational facilities of Duke University and the region. It is available to graduate students and faculty for a broad range of natural resource research proj-

ects. For information contact: Judson Edeburn, Duke Forest Resource Manager, Room 206-A Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Forestry Sciences Laboratory. The Forestry Sciences Laboratory of the USDA Forest Service, Southeastern Forest Experiment Station is located in the Research Triangle Park near Durham. This research organization provides excellent opportunities to complement research conducted by students in the School of Forestry and Environmental Studies. Specialized research projects in timber investment opportunities, market efficiency, forest soils, insect toxicology, and the economics of forestry in developing countries are currently under way at the laboratory. The staff of the laboratory is available for consultation and participation in seminars. Arrangements may be made for students to conduct certain aspects of their research at the laboratory.

Marine Laboratory. The Duke University Marine Laboratory (DUML), an inter-departmental training and research facility of the University, is located on Pivers Island, adjacent to the historic seacoast town of Beaufort, North Carolina. Because of the richness and diversity of the area's flora and fauna (including direct access from the laboratory to the open ocean, Cape Lookout National Seashore Park and the Outer Banks, estuaries, sand beaches, wetlands, and coastal forests), the laboratory provides an excellent opportunity for marine biological study and research. The laboratory accommodates nearly 1,500 visitors per year, including 15 to 20 resident graduate students who are involved in year-round activities. (For additional information concerning the graduate program, refer to the *Bulletin of Duke University: Marine Laboratory* or the section on marine sciences in the chapter "Courses of Instruction.") Academic activities at the laboratory include an undergraduate fall semester and spring semester, a cooperative undergraduate training program with several participating colleges and universities, and three terms of summer courses for both graduate students and undergraduates. These courses fulfill graduate credits in the Departments of Biochemistry, Botany, Geology, Physiology, and Zoology. Research activities by the year-round resident staff include the areas of biochemistry, developmental biology, ecology, geology, oceanography, physiology, and systematics. The physical plant consists of twenty-three buildings, including classroom laboratories, six research buildings, four dormitories, a maintenance complex, and a dining hall. The laboratory has skiffs, a 50-foot training vessel, the *R/V First Mate*, and a new 131-foot research and training vessel, the *Cape Hatteras*, which is operated by the Duke/UNC Oceanographic Consortium.

For information concerning teaching and research space, write to the Personnel and Auxiliaries Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Zoology Field Station. The Zoology Field Station, located less than one mile from campus, provides facilities for the study of penned, free-ranging, and caged animals in a protected wooded area of eighty acres. These facilities include soundproofed observation chambers, barns, aviaries, pens for large animals and birds, and two ponds. For information regarding research space, write to Dr. Mark D. Rausher, Department of Zoology, Duke University, Durham, North Carolina 27706.

Primate Center. The Duke University Primate Center is located in the Duke Forest between Erwin and Cornwallis roads about two miles from the main campus. The colony is composed of approximately 705 prosimian primates representing five families, eleven genera, nineteen species, and twenty-six varieties. This is both the largest and the most diversified colony of living lower primates in the world. The center also houses frozen, preserved, and fossil primate collections. These collections and animals are utilized by faculty members and students in the Departments of Anatomy, Anthropology, Forestry, Geology, Psychology, and Zoology for research in primate paleontology, prosimian aging, locomotion, cytogenetics, comparative anatomy, be-

havior, and physiology. Applications for graduate study in one of these areas should be directed to the Director of Graduate Studies of any of the six departments. For information pertaining to the use of the Primate Center, graduate studies, or availability of research space, write to Dr. Elwyn L. Simons, Director, Duke University Primate Center, 3705 Erwin Road, Durham, North Carolina 27705.

The Vivarium. The vivarium facilities are maintained solely to support research and teaching programs of Duke University. The central vivarium contains forty-four animal housing rooms, four sterile operating rooms, two necropsy rooms, ten project rooms, and a diet kitchen. Presently, Duke medical students and physician's associate students attend classes in animal surgery at the vivarium. A farm facility also is available to accommodate dog kennels and large farm animals. The vivarium is staffed by veterinarians, technicians, and caretakers to assure humane care and treatment of animals. The vivarium is fully accredited by the American Association of Laboratory Animal Care which assures compliance with standards of NIH and D.H.E.W.

Psychology Laboratories. Situated on the main campus, the Department of Psychology occupies approximately 53,000 square feet of air-conditioned space in a building that houses general-purpose laboratories, seminar rooms, classrooms, and a variety of special facilities. These facilities include sound-attenuating and electrically shielded rooms, some for use with human subjects and others for use with animal subjects; rooms for computer-controlled experiments in human perception, memory, and language; electrophysiological recording rooms; and interconnected rooms to provide observation, communication, and videotaping capabilities for the study of social interactions and for the study of personality and clinical processes. There is a fully equipped mobile laboratory to study children at off-campus locations.

As well as such specially designed spaces, there is a variety of support facilities. To aid in the study of animal behavior and psychobiology, there are a breeding colony of ring doves; colonies of pigeons, rats, and mice; and an extensive collection of prosimians. To aid in physiological research, there are surgeries, histology laboratories, and photographic darkrooms. To aid in data collection and analyses, for both human and animal experiments, there are facilities for microprocessor-controlled experiments and videotaping in a variety of situations, including special setups for the study of operant conditioning, perception, and behavioral ecology.

Several laboratories have independent computers, some with graphics capabilities, and there are direct connections to the large-scale computers at the Triangle Universities Computation Center. There are also fully equipped machine, woodworking, and electronics shops staffed by full-time technicians. Additional facilities for research and teaching are available in the laboratories and clinics of the adjacent Duke Medical Center, in the Veterans Administration Medical Center nearby, and in the universities and research companies in the area.

A number of clinical installations for adults and children, specializing in clinical and guidance problems, cooperate with the department in providing facilities for research and training. Clinical research is often conducted at the Duke Psychology Clinic operated by the clinical psychology program. This facility offers a full range of clinical services to adults, children, and families. There is an eighty-acre field station and primate facility in nearby Duke Forest for the study of animal behavior in natural settings.

Chemistry Laboratories. The Department of Chemistry is housed in the Paul M. Gross Chemical Laboratory, a building containing 146,440 square feet of total area. This well-equipped modern chemical laboratory provides conditions very conducive to research. Nuclear magnetic resonance facilities include IBM NR-80, JEOL 60 and 90 MHz multinuclear FT-NMR spectrometers, and several routine proton instruments. A Bruker 250 MHz multinuclear high field FT-NMR system shared with the Research



Triangle Institute is located in nearby Research Triangle Park. Two ESR spectrometers, including a Varian E-9, provide excellent facilities for research in electron spin resonance. Mass spectrometric service is provided by a CEC 21-491 mass spectrometer and a Hewlett-Packard GC-MS system, as well as access to an A.E.I., Ltd., MS-902 located in the Research Triangle Park. X-ray diffraction cameras of all types are available, along with Enraf-Nonius automatic and Picker automatic full-circle diffractometers. Numerous instruments of varying sophistication for photoacoustic, fluorescence, infrared, U.V., and ORD-CD spectroscopy are available. Several preparative and analytical gas and liquid chromatographs are also located in the building. Computing facilities in the Department of Chemistry include a cluster of twelve IBM personal computers and a cluster of five remote job entry terminals which utilize an IBM Series 1, WIDJET system to access the dual IBM 370/165-Amdahl systems of the Triangle Universities Computation Center via a 19 Kb microwave link. The department also houses a DEC 11/42 system (1 Mbyte, 16 terminal) which operates in a multiuser FORTRAN environment emphasizing computer graphics as a training tool. An AED 512 color graphics/imaging terminal is also available. Numerous other computers are associated with specific research groups. The department has a machine shop and an electronics shop. The facilities of the Duke University Marine Laboratory on the coast at Beaufort, North Carolina, are available for specimen and water collecting; joint research projects with members of the resident staff have been conducted in the areas of biological chemistry and chemical aspects of oceanography. The Department of Chemistry Library, with holdings of approximately 42,000 volumes, is also located in the Paul M. Gross Chemical Laboratory. The library receives 600 current scientific serial publications and has a terminal facility for complete information retrieval.

Physics Laboratories. The Physics Building, containing about 103,000 square feet of floor space, is devoted to research and instruction in the Departments of Physics and Mathematics. An additional 27,000 square feet of space is provided in the adjacent Nuclear Physics Building. Graduate students usually have office space in one of these two buildings.

In addition to the lecture halls and the elementary laboratories, there are instructional laboratories for work in electronics and advanced physics.

Nearly half the building is devoted to special laboratories for research in molecular and atomic, nuclear, high-energy, low temperature, and solid-state physics, and in astrophysics and quantum electronics. Special equipment includes microwave facilities operating to beyond 1000 GHz; picosecond, dye, carbon dioxide, and far infrared lasers; one 4 MeV and one high-resolution 3 MeV Van de Graaf accelerator; a 30 MeV cyclotron/tandem Van de Graaf accelerator; a helium liquefier, cryostats, magnets, and associated equipment for research down to the millidegree Kelvin temperature range; a VAX 11/780 computer and several Vector microcomputers for data processing in the high-energy physics laboratory; VAX 11/780 and VAX 750 computers for collecting and processing data in the nuclear structure laboratory; and a Harris H-800 computer for general purpose use.

The Physics-Mathematics Library contains a large selection of books and periodicals. A spacious, well-equipped instrument shop, electronic shops, and a glass shop located in the Physics Building are staffed by eight instrument makers, eight electronics technicians, and a glassblower.

Engineering Research Laboratories. The laboratories of the four departments of the School of Engineering contain extensive basic equipment that may be applied in several specialized fields. Each laboratory also contains selected sophisticated equipment used in advanced research. The facilities available for instruction and research are suggested by the following brief listing of equipment found in each department:

Biomedical Engineering. Ultrasound imaging and transducer laboratories; cellular electrophysiology and neurophysiology instrumentation; stereomicroscope, micro-

manipulators, stimulators, isolation units, and microelectrode puller; facilities for studying biomedical materials and surface interactions; polarizing microscope, internal reflectance infrared spectrophotometer, and dialyzers; soft tissue creep and relaxation test system; biocellular material testing equipment; quantitative videomicroscopy, laser fluorescence microscopy, and nanogram-level micromechanical testing equipment; microprocessor development systems; microprocessor data acquisition and control systems; cardiorespiratory measurements; respirator; and a VAX 11/780 and several PDP-11 and IBM digital computers.

Civil and Environmental Engineering. Well-equipped research laboratories are available for work in environmental engineering, soil mechanics and geotechnical engineering, solid mechanics and materials engineering, structural mechanics and structural engineering, fluid mechanics, water resources and ocean engineering, and urban systems and transportation engineering. Available research facilities include three independent closed-loop electrohydraulic dynamic loading systems (MTS) capable of applying pulses of any shape and controlled in force or displacement modes, frequency range up to 100 cps., load capacity 6,000 and 50,000 lbs. (the 6,000 lbs. actuator can develop a constant crosshead speed up to 50,000 in./min.); equipment for fabricating specimens of and testing fiber-reinforced polymer composites; environmental chamber for testing in the temperature range of -320° to 500° F; ultra-high-pressure triaxial shear apparatus for confining pressures up to 100,000 psi; particle tracking X-ray equipment for soil deformation studies; rock-testing facilities; model-testing equipment for anchored walls, penetrometer studies, and deep pile foundations; a large-aperture research polariscope; a reflective photoelastic polariscope; sustained-loading facility for long duration in studies of prestressed concrete; wet and dry environmental laboratories equipped to analyze a range of physical, chemical, and biological processes; a fully integrated resource recovery pilot plant; calorimetry for the measurement of heating values of secondary fuels; air classifiers interfaced with computer readout; several microcomputers, including the CDC 110, Apple II, and IBM 5150 personal computers with graphics capability; and access to the extensive computer facilities of the Duke University Computation Center as well as the Triangle Universities Computation Center.

The research facilities in water resources are located both indoors and outdoors. Indoors, the laboratory houses flow-measurement devices (flumes, Venturi meters, manometers, etc.) and digital computation hardware. A dual capability teletype terminal is hard-wired to a Data General 32-bit MV/8000 computer supported by three-dimensional color graphic printers and, through an acoustic coupler, the same terminal can be switched to access an IBM 3081 computer at the Triangle Universities Computation Center, the WATSTORE data base system of the U.S. Geological Survey in Reston, Virginia, or any other computation system connected via telephone lines. Outdoors, the Sarah P. Duke Gardens watershed (about 100 acres on campus) has been instrumented with rain gauges, compound weirs, and liquid-level flow recorders enabling hydrologic simulation and calibration and verification with real data.

Electrical Engineering. Digital data processing laboratory equipped with the Data General 32-bit MV/8000 as a time-sharing computer for interactive design, graphics, computation, and computer-aided engineering; Digital Equipment VAX 11/750 work station for VLSI design; microwave facilities for experimentation up to 35 GHz; robotics with a GEP-50 robot; solid-state laboratory with X-ray diffraction and EPR spectrometer; microprocessor laboratory; solid-state power conditioning laboratories with dedicated computers for controlling instruments, including digital processing oscilloscopes and network and impedance analyzers, and for computer-aided design; semiconductor nMOS fabrication laboratory for integrated circuits; and access to the design, fabrication, and research facilities of the Microelectronics Center of North Carolina.

Mechanical Engineering and Materials Science. Biotechnology Laboratory: The biotechnology laboratory investigates how temperature, various organic and inorganic chemicals, and light affect the rates and yields of plant and microbial processes. Both mathematical modeling and experimental studies are carried out. Research equipment includes Millipore filter-sterilization apparatus for media preparation, autoclaves, Wild M5A stereomicroscope, Olympus BHS compound microscope with fluorescence and photomicrography systems, photometer, irradiator, UV-sterilization hood, digital pH/DO meter, colorimeter, shaker water bath, heating and cooling circulators, crossed-gradient culture apparatus, IBM XT personal computer system with graphics. Controlled-environment plant-growth chambers are available on a rental basis in the phytotron.

Integrated Computer-Aided Engineering Laboratory: The ICAE computer lab is currently built around a Data General MV/8000 super-minicomputer jointly shared by the mechanical engineering and electrical engineering departments. The number of terminals and other peripherals available in mechanical engineering currently consists of four Tektronics graphics terminals with hardcopy, a Hewlett-Packard 9836 color graphics system with two digitizing tablets, five General Electric printing terminals, various other alphanumeric terminals, and a medium-speed line printer. In addition, there are a number of Hewlett-Packard 85 desktop computers and associated peripherals which can be linked to the main system. Additions are rapidly being made to the available hardware and it is expected that this will continue in the future. There are a number of sophisticated software packages, implemented by mechanical engineering faculty and students, available on the MV/8000 system. Aside from the engineering data management system RTI/RIM, which is the backbone of the department's integrated design approach, the TKLIB graphics package and the general purpose finite element package SPAR are being used and refined. Many special purpose programs have also been developed for the system and these address such areas as gear design, two-dimensional general field problems, and space frame analysis.

Dynamic Systems and Control Laboratory: The dynamic systems and control laboratory has a variety of basic instruments for measurement and control, for example, storage and dual-beam cathode ray oscilloscopes; X-Y and strip chart recorders; acceleration, temperature, pressure, strain, and force transducers; electrodynamic shaker; and spectrum analyzer. A miniAc analog computer available in the laboratory with built-in nonlinear function generator and digital logic capabilities can be used for linear and nonlinear system simulation and controller synthesis.

Fluid Mechanics Laboratory: The fluid mechanics laboratory offers a variety of instrumentation for experimental research in turbulence and electrohydrodynamics, including laser-Doppler and hot-wire anemometry. The laboratory includes a subsonic wind tunnel with 6 component balance and very large aspect ratio electrostatic precipitator.

Heat Transfer Laboratory: The undergraduate laboratory provides equipment and instrumentation for temperature calibration and measurement, free and forced convection experiments, radiation pyrometry and spectral analysis, heat exchanger performance studies, and optical measurements of heat and mass transfer by a Mach-Zender interferometer. Research instrumentation and equipment include a 100-channel digital data acquisition system, temperature and pressure transducers, boiling heat transfer loop, various flow and energy measurement devices, and a number of compressor-condenser and pump systems.

Materials Science Research Laboratory: Materials science research is supported by a full complement of facilities for modifying and testing the properties of materials and for examining the effects of changes in their internal structure. Heat-treatment and mechanical testing facilities include a variety of vacuum and controlled atmosphere furnaces for melting alloys, doping semiconductors, and growing crystals, metallurgical furnaces for heat-treating alloys, and a completely instrumented 10,000-

pound capacity Instron mechanical testing machine. For materials analysis there is a large range of metallographic facilities, including hardness testers and optical, as well as scanning and transmission electron, microscopes. The scanning electron microscope is equipped for energy dispersive chemical analysis and includes a dedicated data processing unit for both storage and analysis of energy-dispersive X-ray results. Other specialized equipment includes both Doppler-broadening and lifetime equipment for positron annihilation studies of defects in solids. The output of these units is hard-wired to a Data General MV/8000 computer, the capacity of which permits a full range of data analysis methods. Other specialized equipment includes access to X-ray diffraction units including a Berg-Barrett X-ray typograph camera, Debye-Scherrer camera with Gondolphi attachment, a back reflection Laue camera, and a liquid helium low temperature X-ray cryostat. Complete darkroom and other facilities for photographic work are also available. Thin film deposition apparatus permits the preparation of a large variety of both metallic and semiconducting thin films by either normal vacuum deposition or by glow discharge decomposition methods. A variety of thin film test facilities, including high-sensitivity photoconductivity, thermoelastic testing, and other electrical and physical thin film testing apparatus is also available. A differential thermal analysis facility allows the determination of basic phase diagram information as well as quantitative calorimetric data for metallic, polymeric, and ceramic materials.

The shop facilities of the School of Engineering, as well as those located elsewhere on campus, are available to graduate students in all four departments.

The School of Engineering houses a Data 100 medium-speed card reader and printer which communicates directly with various computers located at the Triangle Universities Computation Center in the nearby Research Triangle Park.



F. G. Hall Laboratory for Environmental Research. The F. G. Hall Laboratory for Environmental Research contains eight hyperbaric and/or hypobaric pressure chambers used to simulate altitude or deep-sea diving conditions, for the purpose of both experimentation and medical treatments. The interconnected steel chambers can simulate depths of 3,600 feet, or altitude of 155,000 feet, a capability unmatched in the United States. In 1982 a research dive to 2,250 feet set a new world's record. Research of this type has led to the development of safer and faster decompression tables, better breathing mixtures, and improved types of diving equipment together with new treatments for diving accidents and diseases treated with high-pressure oxygen. The laboratory provides opportunities for training physicians, postdoctorates, and graduate students in pressure-related medicine and physiology. The program is multidisciplinary with major participation by the Departments of Anesthesiology, Physiology, Medicine, Surgery, and the School of Engineering. Administration is by the anesthesiology department of the Duke University Medical Center.

The Medical Center. Over the years the Medical Center has been enlarged and its programs expanded by new construction and by the acquisition of and affiliation with established hospitals.

Currently the Medical Center occupies approximately 140 acres. The southern portion is contiguous with the main quadrangle of the University and consists of the following: Davison Building, Duke Hospital South, Baker House, Barnes Woodhall Building, Diagnostic and Treatment Building, Gerontology Building, Eugene A. Stead Building, Clinical Research II, and the Edwin A. Morris Clinical Cancer Research Building.

The northern portion includes the Nanaline H. Duke Medical Sciences Building, Alex H. Sands Medical Sciences Building, Edwin L. Jones Basic Cancer Research Building, Medical Research Building, Bell Building, Seeley G. Mudd Communications Center and Library, Searle Center for Continuing Education, Eye Center, and Duke Hospital North. An addition to Duke Hospital North to house two more Nuclear Magnetic Resonator (NMR) machines is under construction.

In the western section of the campus are: Research Park Buildings I, II, III, and IV; the Vivarium; and the Animal Laboratory Isolation Facility. A new Clinical and Research Laboratories Building is under construction adjacent to the Sands and Jones Buildings.

In the eastern section of the campus are Pickens Rehabilitation Center, Civitan Mental Retardation and Child Development Center, Child Guidance Center, and Trent Drive Hall.

Student Life



Living Accommodations

Duke University has several residential facilities in which graduate and professional students reside: Town House Apartments and Modular Homes for single students, and Central Campus Apartments for single and married students.

Town House Apartments. Town House Apartments, located about three blocks from the main East-West Campus bus line, is a thirty-two-unit complex which houses single graduate and professional school students. These apartments are more spacious than most apartments found on campus or in Durham. Because the complex is located away from the academic facilities, students find that it offers a change from normal campus life and activities. Apartments are available for continuous occupancy throughout the calendar year.

Each air-conditioned apartment includes a living room, a master bedroom, a smaller bedroom, a bath and a half, and an all-electric kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months.

Occupants must make arrangements with the local utility companies to pay for electricity, gas, and telephone service. These companies usually require a deposit when initial applications for service are made. Utility companies should be contacted prior to arrival as it usually takes several days to obtain service.

Central Campus Apartments. During 1975, Duke University completed a 500-unit apartment complex. Apartments are available throughout the calendar year for continuous occupancy to single and married students attending graduate and professional schools.

All Central Campus Apartments are completely furnished by the University. An itemization of furnishings is included with the floor plans sent out in the application packet.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephones, which are provided in preinstalled locations in each apartment, are serviced through Duke University's Tel-Com telephone service. Central Campus Apartments residents are responsible for having their phones connected.

Efficiency, two-bedroom and three-bedroom apartments are rented to single students. Efficiency units are very limited in number and are generally not available to new students. Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic term to the University. This method permits students to share apartments with others of their choice. When this is im-

practical, the Department of Housing Management strives to place persons with similar interests together.

One-bedroom and two-bedroom units are provided on a lease basis to married students and monthly rental payments should be made as required by the terms of the lease.

Modular Homes. Duke University owns six prefabricated modular homes which are located one block from the main East-West Campus bus line. Three of these three-bedroom homes are occupied by single graduate and professional students. The homes, completely furnished, provide more privacy than most apartments.

The homes are available to single graduate and professional students for continuous occupancy throughout the calendar year.

In addition to having three bedrooms, each home contains a full bath, an all-electric kitchen, a dining area, and a living room. Sliding glass doors in the living room open onto a wooden deck. An outside storage area is provided in addition to spacious closets within the home. Except for the bathroom, kitchen, and dining area, the homes are completely carpeted and paneled.

Residents of the modular homes are responsible for making arrangements with local utility companies for electricity and telephone services.

Duke University Marine Laboratory. The Duke University Marine Laboratory, located on Pivers Island, has cottage-type residence halls which are available. Further information may be obtained from the *Bulletin of Duke University: Marine Laboratory*.

Off-Campus Housing Information. In addition to University housing, the Department of Housing Management maintains an off-campus listing service throughout the year. This service provides a list of privately owned homes, apartments, duplexes, and efficiencies for rent in Durham. A listing for people seeking roommates with housing or roommates needing housing is also provided. During the summer, an assistant is available to answer questions about off-campus housing.

The search for accommodations should begin as soon as possible after acceptance at Duke. A two- or three-day visit would provide the opportunity to use the off-campus listing service and to inspect the facilities available. Except for assuring that owners sign a statement of nondiscrimination, neither the University nor its agents negotiate between the owners and interested parties.

Application Procedure for Apartment Accommodations. The Department of Housing Management provides students accepted to the University with housing application forms and detailed information on rates, rental agreements, and availability of housing. An applicant is considered for assignment only after a completed application form accompanied by the required \$100 deposit has been received. University housing is limited and applications for apartments will be processed on a first-apply, first-assigned basis.

Food Services

Graduate students who wish to eat on campus may participate in Duke University Food Services' innovative food program called DUKey. DUKey allows users to select the location, the time, and the type of food service they desire. At the desired operation, select from the offerings at that location and present your DUKey card for payment.

East Court Cafeteria is located in the East Campus Union Building, and the *Blue & White Cafeteria* is located in the West Campus Union Building. These cafeterias afford customers the opportunity of paying a predetermined price and eating as much as they like. Each cafeteria offers a selection of two or three entrees, a choice of vegetables, a salad bar, a dessert bar, and self-service ice cream and yogurt bars.

Trent Cafeteria, in the mall on the lower level of Trent Drive Hall, offers a wide a la carte selection. The *University Room*, located in the West Campus Union Building on the main level, is open Monday through Friday and serves breakfast, lunch, and a fine selection of steaks, chops, and seafood for dinner. The *Terrace Cafe*, in the Bryan Center, offers gourmet burgers, steak sandwiches, Mexican style foods, and salads.

The *Downunder*, located in the lower level of the Gilbert-Addoms Residence Hall, is open evenings and has a wide variety of fast foods as well as a lounge offering selected beers and wines. The *East Campus Dope Shop* is a soda fountain, and The *Pub at Central*, under construction, will serve sandwiches and drinks.

Gradeli's, located in the mall area of Trent Drive Hall, has a fine selection of hot and cold sandwiches, as well as a small convenience store. The *Cambridge Inn* has big burgers, deli sandwiches, a full selection of convenience food items, and several brands of draft beer. The *Boyd-Pishko Cafe* is fast food right in the middle of the Bryan Center. It offers breakfast biscuits, danish, donuts, and beverages. At lunch it offers burgers, hot dogs, chicken filet sandwiches, ice cream, salads, and beverages.

The *Sprout*, located at Trent Drive, and the *Leaf & Ladle*, in the West Campus Union Building, are salad bars with fresh vegetables, breads, fruits, and home-made soups.

The *Magnolia Room*, in the East Campus building, is open each evening, Tuesday through Friday. Seating is by reservation only. The *Oak Room*, on the second level of the West Campus Union Building, is a full-service restaurant with a wide variety of luncheon and dinner offerings.

Two other services are *Pizza Devil* for pizzas picked up or delivered, and *University Catering* for delivery of anything from coffee-break fare to a full meal. Catering arrangements can be made for groups or special occasions.

For more information on the DUKey program and to open an account, visit the DUKey Card Office. It is located on the lower level of the West Campus Union Building, Room 024.

Services Available

Medical Care. The purpose of the Student Health Service is to provide any medical care and health advice necessary for a sense of well-being as the student participates in the University community. The health service maintains the Student Health Services Clinic located in the Pickens Building on West Campus and the University Infirmary on the East Campus. (The University Infirmary is not open during the summer.) Emergency transportation can be obtained by the Duke campus police. A separate fee for the Student Health Service is assessed.

The Student Health Service offers varied benefits. *The student health fee is charged all full-time students and part-time degree candidates, except students who are registered in absentia.* The student health fee is nonrefundable after the first day of classes in the semester. During the summer, all students are charged a health fee for each summer term for which they are registered; graduate students must be registered for at least 1 unit of research or 3 units of course work.

The Student Health Services Clinic offers the student outpatient services, routine laboratory and X-ray examinations in the clinic for the treatment of acute illness or injury, and advice and assistance in arranging consultation for medical treatments. Fees for such consultations or treatments must be paid by a student who is not covered by an insurance plan.

The facilities of the University Infirmary are available to all currently enrolled full-time students in residence during the fall and spring. Hospitalization in the University Infirmary is provided for treatment of acute illness or injury as authorized by the Student Health Services Clinic physician. Students are required to pay for their meals while confined to the infirmary.

The resources of the Duke University Medical Center are available to all Duke students and their spouses and children, although any bills incurred at Duke Hospital or any other hospital are the responsibility of the student, if not covered by an insurance plan. The Student Health Program does not provide health care for spouses and dependent children of married students. Coverage of the married student's family is provided in the University's Student Accident and Sickness Insurance Plan for an additional fee.

The University has made arrangements for a Student Accident and Sickness Insurance Plan to cover all full-time students for a twelve-month period. For additional fees a student may obtain coverage for a spouse and a child. Although participation in this program is voluntary, the University requires all graduate students to be financially responsible for medical expenses above those covered by the University Student Health Program through the University Accident and Sickness Policy, a private policy, or personal financial resources. Students who have equivalent medical insurance or wish to accept the financial responsibility for any medical expense may elect not to take the Duke plan by signing a statement to this effect. *Each full-time student in residence during the fall and spring must purchase this student health insurance or indicate the alternative arrangement.* The Student Accident and Sickness Insurance Policy provides protection twenty-four hours per day during the full twelve-month term of the policy for each student insured. Students are covered on and off campus, at home, while traveling between home and school, and during interim vacation periods. The term of the policy is from the opening day of school in the fall. Coverage and services are subject to change each year as deemed necessary by the University in terms of costs and usage.

All full-time students (those registered for 15 units, assistants registered for 9 or 12 units, or students registered for at least 3 units if the preliminary examination has been passed) are enrolled in and charged for the Student Accident and Sickness Insurance Policy unless they submit properly completed and signed waivers by the published due date. All foreign students are required to enroll in the University insurance plan or complete the waiver listing the policy number and name of the insurance company providing their comparable coverage. Full payment for student insurance is due at the beginning of the term (insurance may not be paid via payroll deduction).

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) is a component of student services which provides a coordinated, comprehensive range of counseling and developmental services to assist and promote the personal growth of Duke students.

The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide direct services to students including evaluation and brief counseling/psychotherapy regarding a wide range of concerns. These include issues of self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. While students' visits with counselors are usually by appointment, a walk-in consultation service is provided two hours each weekday for students with urgent personal concerns.

Each year CAPS offers a series of self-development seminars focusing on skills development and special interests. These explore such interests as stress management, assertiveness training, career planning, public speaking anxiety management, and issues pertaining to graduate and professional women. Interested students may contact CAPS for further information.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admissions tests and professional licensure and certification examinations.

Another function of CAPS is the availability of the staff to the entire University community for consultation and educational activities regarding student develop-

ment and mental health issues affecting not only individual students but the campus community as a whole. The staff works with campus personnel including administrators, faculty, student health staff, religious life staff, and student groups in meeting needs identified through such liaisons. Staff members are available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If students desire that such information be released to anyone, they must give written authorization for such release.

Initial evaluation and brief counseling/therapy, as well as career and skills development seminars, are covered by the student health fee. There are no additional costs for these services. If appropriate, referral may be made to other staff members or to a wide variety of local resources.

Appointments may be made by calling 684-5100 or coming by the office in 214 Old Chemistry Building, West Campus between 8:00 A.M. and 5:00 P.M. Monday through Friday. If a student's concern needs immediate attention, that should be made known to the secretary and every effort will be made to arrange for the student to talk with a staff member at the earliest possible time.

Office of Placement Services. Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business and industry, education, and government. The Office is located in 214 Flowers Building.

The staff is available to talk with graduate students about their future professional plans. Students who are eligible to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to support applications for permanent positions and to have a permanent file for future reference. Pertinent recommendations should be accumulated while the student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year for students registered with the Office of Placement Services. Part-time employment listings for the campus and Durham area are maintained in the office. All students interested in working during the summer session should register at the beginning of the term.

All services are offered without charge to Duke students and alumni.

Student Affairs

Cocurricular Activities. Graduate students at Duke University are welcome to use such University recreational facilities as swimming pools, tennis courts, the golf course, and to affiliate with the choral, dance, drama, music, and religious groups. They may become junior members of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities.

A full program of cultural, recreational, and religious activities is presented by the Office of Cultural Affairs, the Duke University Campus Ministry, the Duke University Union, the Office of Student Activities, and recreational clubs. The Duke University Union sponsors a wide range of programs through its committees, which are open to all segments of the campus community. Included are touring Broadway shows; rock, jazz, and pop concerts; speakers; films; a film-making program; the largest fully student-run television station in the country; art exhibits in two galleries; and a broad program in crafts located in Southgate Dormitory and the Bryan University Center. The Aquatic Center and the Card Gymnasium pool are available to students, faculty, and staff families. The handball, racketball, squash, and tennis facilities and the weight room in the basement of the Aquatic Center are also available. Interested students may participate in softball and other team sports.

The University Center complex includes the new Bryan University Center, which houses the Information Center, two drama theaters, a film theater, lounges, stores,

meeting rooms, games room, the Terrace Cafe, art gallery, and other facilities; the West Union, which includes dining facilities; and Flowers Building, which includes student publications, Page Auditorium, and the University box office.

Inquiries should be directed to the Recreation Office, 105 Card Gymnasium; the Office of Cultural Affairs, 109 Page Building; Duke Chapel; the Duke University Union, Bryan University Center; or the Office of Student Activities, Bryan University Center.

Full information regarding the scheduling of major events and programs for the entire year will be found in the Duke University *Annual Calendar*; detailed and updated information for the fall and spring semesters in the *Weekly Calendar*, available each Friday; updated information for the summer session in the *Summer Session Calendar*, published at the beginning of each summer term; and the *Duke Chronicle*, published each Monday through Friday during the fall and spring and each Wednesday during the summer. Copies of the Duke University calendars may be obtained at the information desk, Bryan University Center, or the calendar office, Page Building. Also during the summer, the *Summer Session Newsletter* is published weekly by the summer session office and is available at convenient locations.

Graduate and Professional Student Council. The Graduate and Professional Student Council is the representative body for the students of graduate departments and professional schools. The council provides a means of communication between schools and between graduate students and the administration. The council selects graduate students for membership on University committees. Representatives of each department and officers of the council are selected annually.

Religious Life. The Duke University Chapel, open from 8:00 A.M. until 11:00 P.M., provides a magnificent setting for daily prayer and meditation. In addition, a variety of worship experiences are provided throughout the week including the University service of worship at 10:55 A.M. each Sunday and morning prayer at 8:35 A.M. each weekday. The 150-voice Chapel choir is open by audition to all interested singers.

The Duke Campus Ministry provides a larger ecumenical community for numerous religious groups on campus as well as pastoral care for any member of the University community. Graduate student participation is welcome and strongly encouraged. Contact the office of Minister to the University, Duke Chapel, for further details.

Research and Publications

The departments of Duke University are devoted to research as well as to instruction. Since a prime purpose of the University is the promotion and diffusion of knowledge, attention in the Graduate School is focused on research and publication. To this purpose, the Provost annually appoints a University Research Council which receives applications from members of the various faculties for subsidies in support of research. The policy of this council is to encourage the initiation and completion of substantial research projects.

Duke University Press. Duke University Press was created in 1925 as a successor to Trinity College Press. Since its organization, the press has published nearly 700 books and over 1,280 issues of journals, currently being published at the rate of 38 issues a year (ten journals). Publications cover most of the major scholarly disciplines: literature, history, economics, political science, sociology, psychology, philosophy and religion, and interdisciplinary and professional areas including gerontology, business, law, demography, medieval and Renaissance studies, Latin American studies, Soviet-East European studies, and general international studies.

The press has instituted a number of successful series, among the newest of which are *Duke Press Global Issues*, a set of textbooks on the critical issues of food, population, energy, and environment; *At the Polls*, in which the press joins with the American Enterprise Institute for Public Policy Research in the publication of AEI's

highly acclaimed series on the electoral process as it functions in democracies around the world; *Duke Press Policy Studies* (DPPS), devoted to the timely dissemination of policy-oriented research including historical and conceptual analyses related to current issues (nearly forty titles published since its beginning in 1982); and *Living with the Shore*, a series of over twenty titles on coastal management. Duke University Press also publishes books suitable for classroom use or for the general reader in the United States and overseas, simultaneously in hardcover and paperback.

Other series published by the press include Duke Monographs in Medieval and Renaissance Studies, *American Literary Scholarship* (the twentieth volume was published in 1984), publications of the Consortium for Comparative and Legislative Studies, *Studies in Social and Economic Demography*, and, largest of all, with forty-nine volumes published to date, the publications of the *Duke University Center for Commonwealth and Comparative Studies*: expanded to include all areas of the world and renamed, *Duke University Center for International Studies Publications*. One of the press's more important publication projects is the ongoing contemporary publication of *The Collected Letters of Thomas and Jane Welsh Carlyle*, Duke-Edinburgh edition. Volumes 10, 11, and 12 will be published in 1985, and when the entire collection of letters is published, more than thirty volumes will make available, for the first time, all the known letters of both the Carlyles.

Duke University Press is one of the leading publishers of scholarly journals. The press continues publication of the *South Atlantic Quarterly*, first published at Trinity College in 1902, and in 1926 the press revived the *Hispanic American Historical Review*, published in cooperation with the Conference on Latin American Studies of the American Historical Association. In 1932 the press began publication of *Character and Personality*, which since 1945 has been named *Journal of Personality*. In 1935 the press began publication of the *Duke Mathematical Journal*. In 1969 *History of Political Economy* began





publication as a semiannual, changing a few years later to a quarterly. Publication of *Journal of Medieval and Renaissance Studies*, a semiannual, began in 1971. The two newest journal acquisitions are *Social Science History* and *Social Science Micro Review*.

At Duke University Press the emphasis is on publication of scholarly and professional books and journals. Books are offered for course adoption whenever feasible, and submissions of materials with a course application are welcome if a suitably large course adoption market exists. Duke faculty members are well represented among the more than forty books a year published by the press, and within its journals, but authors come from all parts of the world representing major institutions of learning and scholarship.

In 1983 the press moved to new quarters in the completely remodeled Crowell Science Building on Duke's East Campus. The interior of the two upper floors of Crowell (which is on North Carolina's Register of Historic Buildings) was redesigned and rebuilt to accommodate the press's new computer and the additional office space made necessary by an expanded publishing program. As part of the remodeling, Crowell's charming, late nineteenth-century exterior was restored to its original handsome appearance.

Visiting Scholars

The libraries and other facilities of Duke University are made available, to the extent practicable, to faculty members of other colleges and universities who wish to pursue their scholarly interests on the Duke campus. Such visitors are not charged unless they wish to participate in activities for which a special fee is assessed. Inquiries pertaining to visiting scholars should be addressed to the department chairman concerned or the Dean of the Graduate School.

Postdoctoral Research

Scholars engaged in postdoctoral research often find it advantageous to use the resources of Duke University during the summer. The University welcomes these visitors and makes living accommodations available to them during the summer sessions from May 9 to August 8. Persons desiring research privileges (library and/or laboratory) should request approval through the department in which the research interests lie or through the Graduate School.

Admission



Degree and Nondegree Admission

Admission to the Graduate School is required of all students who intend to pursue study toward a degree offered by the Graduate School. All applicants are considered without regard to race, color, religion, sex, age, handicap, or national origin.

Students who have discontinued a program of graduate degree work at Duke and later wish to continue their study must be readmitted to the Graduate School. Those who discontinue study *prior* to completing a degree must, by letter, request permission of the Dean to be readmitted to the degree program; students who discontinue study *after* earning a master's degree must file a new application for the doctoral program.

A student who holds a bachelor's degree and who does not intend to earn an advanced degree at Duke University at the present time but who desires graduate work for professional or other reasons may consider three options: (1) admission as a regular nondegree student in the Graduate School, which involves application to a particular department and fulfillment of standard application procedures and requirements; (2) admission as a special nondegree student through the Office of Continuing Education in conjunction with the Graduate School, without departmental affiliation, following special application procedures; and (3) admission as an unclassified student in the summer session only, requiring application to the Director of the Summer Session.

Credits earned by nondegree students in graduate courses taken at Duke before full admission to the Graduate School may be carried over into a graduate degree program if (1) the action is recommended by the student's Director of Graduate Studies and approved by the Dean, (2) the work is not more than two years old, (3) the amount of such credit does not exceed 12 units, and (4) the work has received grades of G or better.

Prerequisites

For Admission to the Graduate School. A student seeking admission to the Graduate School of Duke University must have received a bachelor's degree (or the equivalent) from an accredited institution. The student's undergraduate program should be well-rounded and of high quality, indicating ability for graduate study. Usually the student should have majored in the area of intended graduate study; many departments (see the chapter "Courses of Instruction") list specific prerequisites. Satisfactory scores on the Graduate Record Examination are required by all departments.

Note: Persons interested in the Master of Arts in Liberal Studies should contact that program directly for information about requirements for admission.

For Admission to the Summer Session. Students in the following categories may be admitted to the Duke University Summer Session. *Duke Students:* newly admitted and current students in good standing may attend the summer session; no application is required. *Non-Duke Students:* other persons will be admitted to the summer session provided that (1) they are in good standing at a fully accredited college or university, or (2) they were in good standing at the last fully accredited college or university that they attended. Applications may be obtained from the Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706. Applications may be submitted at the time of registration.

Admission to specific courses offered in the summer session is governed by the student's academic status (graduate, nondegree, or unclassified) and by the prerequisites of the course in question.

For Admission through Continuing Education. A student seeking admission as a nondegree continuing education graduate student at Duke must have received a bachelor's degree and must either reside in the area or be moving to the area with the intention of residing here for a substantial period of time. Application materials and additional information may be obtained from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

Procedures

A student seeking admission to the Graduate School should obtain an application packet from the Dean of the Graduate School. (Note: Persons seeking admission to the Master of Arts in Liberal Studies should contact that program directly for information, requirements, and special application materials.) This packet contains the necessary forms and detailed instructions on how to apply. The application form must be filled out completely, signed, and returned to the Office of Graduate Admissions accompanied by a nonrefundable fee of \$35* in U.S. currency (check or money order) payable to Duke University. In addition, the student should provide the following supporting documents: (1) two copies of the official transcript from each postsecondary institution attended (college, university, or seminary) sent directly to the Graduate School by the institution; (2) two supplementary transcripts, sent as soon as possible, showing completion of work which was in progress when the earlier transcript was made; (3) three letters of recommendation from persons best qualified to judge the applicant as a prospective graduate student, written on the forms provided and returned by the applicant in the confidential envelopes that have been sealed-then-signed by the recommenders (or returned directly to the Graduate School by the recommender); (4) official scores on the Graduate Record Examination General (Aptitude) Test for applicants to all departments; and (5) official scores on the Graduate Record Examination Subject (Advanced) Test for applicants to programs in botany, English, literature, mathematics, music, physics, Romance languages, and zoology. It is recommended that a student take the GRE Subject Test if applying to anatomy, biochemistry, chemistry, electrical engineering, geology, mechanical engineering, microbiology and immunology, pathology, pharmacology, physiology, political science, or psychology. Applications cannot be reviewed until all supporting documents are on file. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

Students applying for financial aid in all departments should take the Graduate Record Examination no later than the October testing in the previous year in order to meet the February 1 deadline. (The deadline is January 15 for the program in clinical psychology only.) Information on the times and places of the Graduate Record Ex-

*All fees are based on current charges and are subject to change without notice.

aminations can be provided by the applicant's college or the Educational Testing Service, Box 955, Princeton, New Jersey 08541.

Additional Procedures for Foreign Students. Fully qualified students from outside the United States are invited to apply for admission to full-time study in the Graduate School. The foreign student must, in addition to the information required of all students, submit with the application material (1) if the student's native language is not English, certification of English proficiency demonstrated by official scores from the Test of English as a Foreign Language (TOEFL), administered through the Educational Testing Service, Box 899, Princeton, New Jersey, 08541 (the Graduate School requires a score of 550 or higher on the TOEFL); and (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per calendar year are between \$16,000 and \$17,000†).

During new matriculants' first registration period at Duke, every foreign student whose native language is not English will be required to take a test to verify competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack necessary competence should be prepared to undertake additional English language instruction. Students who do not successfully pass the test for competence in the use of oral and written English by the end of their first year of residency will not be permitted to continue graduate work at Duke University. Passing this examination will not meet degree requirements for a foreign language. (See language requirements for foreign students in the chapter "Registration and Regulations.")

Part-Time Graduate Study. Many graduate departments will consider applications from students wishing to pursue degree study on a full-time or part-time basis. Admission requirements, procedures, and deadlines are the same for both full- and part-time students. See the chapter "Registration and Regulations" for additional rules governing minimum registration, time limitations, and financial aid restrictions on part-time study. Visa restrictions do not allow nonimmigrant students to pursue graduate study on a part-time basis.

Review of Applications and Notification of Status. Admission to the Graduate School is offered only by the Dean. A departmental admissions committee, usually headed by the Director of Graduate Studies, reviews the application in depth and makes a recommendation to the Dean, who then makes the final decision on admission and contacts the student.

All applications are reviewed competitively. Attention is given to every aspect of an application, with an attempt made to evaluate past achievement as well as scholarly potential. Academic records, letters of recommendation, GRE scores, as well as the candidate's own statements are all taken into consideration in the review process.

When admission is approved, the student will receive a letter of admission from the Dean and an acceptance form. *The process of admission is not complete until the acceptance form has been returned.* An admission offer is only for the semester specified in the letter of admission, and *admission may not be deferred* automatically from one term to another.

Applicants who are admitted will be offered full admission, provisional admission, or nondegree admission. *Provisional admission* for a trial period of one semester or a minimum of 12 hours of course work is offered to students who appear to warrant admission but do not fully comply with admission requirements. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission. *Nondegree admission* is

†Figures are based on 1984-85 charges and are subject to change before the fall 1985 semester.

offered to students who meet the admission requirements and who desire to engage in graduate study not subject to the restrictions of a graduate degree program. With the approval of the student's major department and the Dean of the Graduate School, a maximum of 12 units of credit earned under nondegree status may be applied toward an advanced degree at Duke University if and when the student is granted full admission. (See ruling under master's degrees in the chapter "Registration and Regulations.")

Summer Session Procedures. Applicants who wish to begin graduate work during the summer must apply to the Dean of the Graduate School for admission *and* to the Director of the Summer Session.

Graduate students who are in residence during the spring semester and who plan to attend the summer session should at the time of registration for the semester enroll for the desired summer session courses.

Continuing Education Nondegree Graduate Student Procedures. Applications may be obtained from the Office of Continuing Education and must be returned to the Graduate School, accompanied by a nonrefundable \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester. More detailed information is available from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.



Deadlines for Application

It is the applicant's responsibility to make certain that the Graduate School office has received all required material before the specified deadlines. Only complete applications can be considered. (A complete application includes all required supporting credentials.) To ensure that the admissions office will have adequate time to assemble all items submitted on an applicant's behalf, applications should be sent at least *two weeks* before the stated deadlines.

FOR FALL SEMESTER

January 15. Final date for completion of applications to program in *clinical psychology only*.

February 1. Final date for completion of applications for admission *and* award for the fall semester. This is the *priority filing date*; applications completed after this date may be considered for admission, if all spaces have not been filled, and for financial aid, if funds are still available. All students seeking fall admission should complete their applications by February 1, since it is likely that enrollment in many departments will be filled soon after this date. Applications that are incomplete on February 1 cannot be considered for awards until decisions have been made on all complete applications.

July 15. Final date for completion of applications for admission *without award* for the fall semester, space permitting. *No applications for fall received after this date will be considered.*

FOR SPRING SEMESTER

November 1. Final date for completion of applications for admission to the spring semester, space permitting. Not all departments accept new students for the spring semester, nor is financial aid readily available for spring matriculants.

FOR SUMMER SESSION

Students seeking admission to the Graduate School for study in the summer session should apply to the Dean of the Graduate School and to the Director of the Summer Session.

April 15. Last day for completing application to summer session Term I.

May 15. Last day for completing application to summer session Term II.

Financial Information



Tuition and Fees*

NEW STUDENTS ENROLLING FALL SEMESTER 1985

The 1985-86 tuition for new students enrolling during the fall semester (except those students in health administration and physical therapy) for a full semester is \$3,156 (12 units at \$263 per unit) or \$2,367 (9 units at \$263 per unit) for teaching and research assistants. In addition to tuition, there is a required registration fee of \$100 each semester.

STUDENTS MATRICULATING BEFORE 1985-86

The 1985-86 tuition for all students (except those in health administration and physical therapy) for a full semester program in the fall or spring is \$3,945 (15 units at \$263 per unit). Part-time tuition is calculated at the same rate of \$263 per unit in the fall and spring and at the rate of \$214 per unit in the summer. Tuition charges are due and payable at the times specified by the University for that term. A late registration fee of \$25 is charged any student not completing registration during the registration periods. The *in absentia* fee is due on the date specified by the University and is subject to a late registration fee of \$10 if not paid by that date. The fee is \$263 for 1 unit during the fall or spring and \$214 during the summer.

Payment of Accounts. Duke University does not have a deferred payment plan for tuition, fees, and other charges. New students are expected to pay tuition and fees at the time of matriculation. Following first enrollment in the Graduate School, monthly invoices are sent each student by the Bursar's office. As a part of the agreement of admission to Duke University a student is required to pay all invoices as presented. A late payment charge will be assessed for all charges not paid in full by the due date, and certain restrictions may be applied.

Graduate students who receive payments from the University for fellowships, assistantships, or employment and who plan to pay tuition and fees and/or campus housing charges via payroll deduction must make arrangements in the Bursar's office for payroll deduction by the published deadline date for each semester in order to avoid assessment of the late payment charge.

All full-time graduate students (those registered for 15 units, new students registered for 12 units, assistants registered for 9 or 12 units, or students registered for at least 3 units after the preliminary examination has been passed) and part-time degree

*All fees are based on current charges and are subject to change without notice.

candidates are charged the student health fee as well as student accident and sickness insurance coverage unless they file properly completed and signed insurance waivers in the Bursar's office by the invoice due date. Students registered *in absentia* are not charged the health fee and insurance unless they elect to enroll in the insurance plan. *The student accident and sickness insurance payment is due in full at the beginning of the term (insurance may not be paid by payroll deduction). Payment in full for campus housing is due at the beginning of each semester unless the student qualifies for University payroll deduction for the housing charge.*

Late Payment Charge. If the total amount due on the student's invoice is not received by the Bursar by the invoice due date, a penalty charge will be accrued from the billing date of the invoice (matriculation date for new students). The late payment charge is assessed at a rate of 1½ percent per month (16 percent per annum) applied to the past due balance. The past due balance is defined as the previous balance less any payments and credits received during the current month (including any student loan memo credits related to the previous balance which appear on the invoice).

Restrictions. An individual will be in default if the total amount due is not paid in full by the due date. A student in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Reduction in Registration and Tuition. Refunds are granted students who reduce registration on the drop/add date at the beginning of each semester. During the four-week period at the beginning of the fall and spring semesters, students who pass the preliminary examination or final degree examination may obtain a reduction in their registration and tuition. A reduction in registration and tuition necessitated by changes in departmental service requirements for assistants may be made during the first two weeks of classes with approval of the Dean.

Refunds for Withdrawal from School during Fall and Spring Semesters. For students who withdraw from school or who are withdrawn by the University, refunds of tuition and fees are governed by the following policy.

1. In the event of death, refund of full tuition and fees will be granted.
2. In all other cases of withdrawal from the University, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:
 - a. Withdrawal before classes begin: full refund;
 - b. Withdrawal during the first or second week of classes: 80 percent refund (the student health fee will not be refunded);
 - c. Withdrawal during the third, fourth, or fifth week of classes: 60 percent refund (the student health fee will not be refunded);
 - d. Withdrawal during the sixth week: 20 percent refund (the student health fee will not be refunded);
 - e. Withdrawal after the sixth week: no refund.
 - f. Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward.
3. If a student changes his or her status from full time to part time, has to drop a course for which no alternate registration is available, drops special fee courses (music, golf, etc.), or drops a paid audit during the first two weeks of the drop/add period, a full refund may be granted with the approval of the Dean. (The student health fee will not be refunded.)

Withdrawal Charges and Refunds during Summer Session. Students who will not be attending a summer term or course(s) for which they have registered (course

card submitted), must follow the correct procedure and drop the course(s) prior to the first day of the term, even if they have not paid tuition and fees. Failure to drop the course(s) will result in administrative withdrawal from the summer term at the end of the first three days of the term and in billing the student for 20 percent of the tuition plus the health fee. If tuition and fees have been paid for the summer term, the following refund policies apply:

1. When applications for withdrawal from a term or drop of a course are received by the Director of the Summer Session after the third class day, there will be no refund of tuition and fees.
2. When applications for withdrawal from a term or drop of a course are received by the Director of the Summer Session during the first three class days of a given term, 80 percent of the tuition will be refunded. There is no charge for drops and adds which result in no change in tuition. The health fee will not be refunded.
3. When applications for withdrawal from a term or drop of a course are received by the Director of the Summer Session before the first class day of a given term, full tuition and fees will be refunded.

Special Tuition Benefits for Employees. The Graduate School recognizes a special obligation to encourage the professional and personal advancement of employees.

The University grants reductions in tuition to eligible employees enrolling in courses offered by the University, providing the eligible individual is *not* taking courses for the purpose of attaining a degree. Staff members and employees paid on the biweekly payroll are eligible for this benefit upon completion of one year of continuous service. The staff member's spouse is eligible at the time the staff member becomes eligible, and the faculty spouse becomes eligible at the time that the faculty member is eligible to participate in the Retirement Annuity Plan.

The benefit is equal to one-half the regular course tuition charged. The program is applicable only to courses at either the undergraduate or graduate level offered by Duke University. Staff members and employees paid on the biweekly payroll must obtain the permission of their immediate supervisor to be excused from work during the period that the course is to be held (if during normal working hours). No more than two courses may be taken in any one semester.

Although this program may be used either for courses which are to be audited or for courses being taken for credit, it may not be used for the purpose of attaining a degree. The individual may not enroll as a degree candidate at either the undergraduate or graduate level.

The individual desiring to utilize this benefit must meet all academic standards set by the appropriate dean for the course or courses to be taken. Registration is on a space-available basis, and requests for approval of tuition reduction should be made at least one week in advance of the tuition payment due date. Inquiries should be directed to Harrison Brooke or Cynthia R. Shumate, University Budget Office, 303 Allen Building, 684-5804.

Thesis or Dissertation Fees. Fees incurred in connection with a thesis or dissertation are as follows:

Binding fee, three University copies of thesis or dissertation*	\$22.50
Microfilming fee, doctoral degree only, upon final submission	\$35
Copyright fee (doctoral degree only, optional)	\$20

*A deposit of \$5 will be collected for each additional snap binder needed beyond the binders for the University copies.

Athletic Fee. An athletic fee of \$75 for football and basketball games, or \$20 for football games only, is optional and payable in the fall semester. The Treasurer of the

University has sole responsibility for collection of fees and for arranging for the pro-rata of fees.

Fee for Undergraduate Courses. Graduate students registering for undergraduate courses will be assessed 3 units for a nonlaboratory course and 4 units for a laboratory course.

Marine Laboratory Fee. For Marine Laboratory investigators' research table fee, see the *Bulletin of Duke University: Marine Laboratory*.

Audit Fee. Students registered full time during fall and spring may audit courses without charge. Students may not audit activity courses, e.g., physical education, applied music, or special courses designed to assist graduate students in acquiring a reading knowledge of French or German. Otherwise, audit fees are \$103 per course.

During the summer, students registered for a full course program (two courses) may audit nonlaboratory courses, except physical education activity courses, applied music courses, and studio art courses, (with the permission of the instructor and the Director of the Summer Session) at no extra charge. Students carrying less than a full course program during the summer may be granted permission by the instructor and the Director to audit a course (above restrictions apply) but must pay half the University tuition charge for the course.

Vehicle Fee. Each student possessing or maintaining a motor vehicle at Duke University shall register it at the beginning of the fall semester in the security office at 2010 Campus Drive. A student who acquires a motor vehicle and maintains it at Duke University after academic registration must register it within five calendar days after operation on the campus begins. Resident students are required to pay an annual fee of \$30 for each motor vehicle or \$15 for each two-wheeled motor vehicle. Resident students registering a vehicle for the first time after January 1 are required to pay \$20 for a motor vehicle or \$10 for a two-wheeled motor vehicle.

At the time of registration of a motor vehicle, the state vehicle registration certificate, a valid driver's license, and a student identification card must be presented.

If a motor vehicle or a two-wheeled motor vehicle is removed from the campus permanently and the decal is returned to the traffic office prior to January 20, there will be a refund of \$10 for a motor vehicle and \$5 for a two-wheeled motor vehicle.

Students enrolled in the summer session only must also register their motor vehicles with the traffic control office. The fee is \$4.50 for thirty days.

Transcript Fee. Students who wish to obtain copies of their academic records should direct requests to the Registrar's office. A fee of \$1 is charged for each copy.

The Student Health Fee. All full-time students and part-time degree candidates (except those registered *in absentia*) are assessed a fee for the Student Health Service. For the fall and spring, the fee is \$190 (\$95 each semester). For the summer, the fee is \$31 per term. Graduate students who are only in residence for summer Terms I and II are required to pay \$62 which covers both terms. The health fee will be \$25 for each five-week period at the Marine Laboratory.

Expenses*

Housing Fee. The fee for Town House Apartments, not including utilities, is \$1,865 per occupant for the fall and spring on the basis of two students to a two-bedroom apartment. The fee for modular homes, not including utilities, is \$1,642 per occupant on the basis of three students to a home. Rates in Central Campus Apart-

*The figures contained in this section are based on 1984 figures and are subject to change prior to the beginning of the fall 1985 semester.

ments range from \$1,875 for three students in a three-bedroom apartment to \$2,896 for an efficiency apartment.

During the summer, one-, two-, and three-bedroom apartments are available and rates vary according to the type of unit desired and the number of persons occupying the apartment.

Housing fees are subject to change prior to the 1985-86 academic year. A \$100 deposit is required with all applications. Refund on housing fees is made in accordance with the schedules published by the Department of Housing Management. For further information on housing facilities, see the section on living accommodations in the chapter "Student Life."

Food. Food service is described in the section on living accommodations in the chapter "Student Life." The cost of meals is estimated at a minimum of \$9 per day, or about \$2,085 for the academic year, but depends upon the needs and tastes of the individual.

Summary. The table below represents an estimate of a graduate student's basic expenses during the fall and spring for a full program of work. Miscellaneous items (recreation, travel, clothing, laundry, etc.) will vary according to personal needs and tastes.

	Continuing Students	New Students
Tuition	\$7,890 (15 units)	\$6,312 (12 units)
Registration fee	0	200
Student health fee	190	190
Apartment rent (Central Campus Apts.)	2,896	2,896
Meals	2,085	2,085
Books	500	500
Miscellaneous (laundry, etc.)	2,060	2,060

The estimated cost for one term of the summer session is:

Tuition (two nonlaboratory courses or 6 graduate units)	\$1,284
Student health fee	31
Residence hall fees	442
Meals	466
Books and class materials (average)	55
Miscellaneous (laundry, etc.)	190

Fellowships and Scholarships

Application Procedure. Fellowships and scholarships are available to students in most graduate programs. A student who desires to be considered for any of the following fellowships, scholarships, or assistantships should indicate his or her wishes by answering affirmatively the questions pertaining to financial aid on the application form for admission and award. Selection of recipients of awards is made on the basis of academic merit and departmental recommendations.

While personal financial need may not be the basis for the granting of many graduate awards, the Graduate School requires all matriculating students (except non-United States citizens) to complete the Graduate and Professional Student Financial Aid Service (GAPSFAS) form.

James B. Duke Fellowships. The James B. Duke One-Hundredth Anniversary Fund provides fellowships for students who wish to pursue a program leading to the

Ph.D. degree in the Graduate School at Duke University. Its objective is to aid in attracting and developing outstanding scholars at Duke. Selection of recipients is made by a faculty committee upon nomination by the appropriate department. These fellowships provide for payment of tuition for full registration during the academic year, plus *in residence* registration during the summer sessions. They also provide an income stipend of \$916.67 per month for twelve months during the duration of the award. Students entering with baccalaureate degrees may hold this fellowship for three years. Students entering with master's degrees may be fellows for two years. The award requires no service and is renewable each year upon evidence of fellowship quality performance in progressing toward the degree. The total value of a James B. Duke Fellowship over the three years of tenure for a student who passes the preliminary examination at the end of the second year is over \$50,000 at current tuition rates. There are forty-seven James B. Duke fellows currently enrolled.

Andrew W. Mellon Graduate Fellowships in the Humanities. As many as five or six one-year dissertation fellowships will be awarded to graduate students in the humanities. Selection of recipients will be made by a faculty committee upon recommendation by the appropriate department. These fellowships provide for payment of in-residence tuition and health fees plus a monthly stipend.

Endowed Fellowships. Other special endowments provide fellowships for graduate study. The Angier B. Duke Fellowship provides support on the same level as the James B. Duke Fellowship for one student for the academic year. There are five Gurney Harris Kearns Fellowships in religion ranging in value up to \$9,684. Selection for these fellowships is made through faculty committees. The E. Bayard Halsted Fellowship in science, history, or journalism is awarded to a graduate of Duke University intending to pursue an advanced degree at Duke. This fellowship, which is administered by the Graduate School, provides a monthly stipend plus tuition to an outstanding graduate student working in a broad area of science, history, or journalism. The Frank T. de Vyver Fellowship, administered by the Department of Economics, is awarded each year to an outstanding student entering the doctoral program in economics. The Clare Hamilton Memorial Endowed Fellowship, a gift of the Hamilton family in memory of their daughter, is awarded yearly on the basis of merit and need to one or more outstanding students in clinical psychology. Relatives and friends of the late Professor Charles R. Hauser established the Charles R. Hauser Fellowship to be awarded to an outstanding graduate student in the last year of work toward a Ph.D. degree in chemistry. The Department of Chemistry administers this fellowship, which is awarded to a student working in the area of organic chemistry. The Calvin Bryce Hoover Fellowship, established in honor of the late Professor Calvin Bryce Hoover, is administered by the Department of Economics and is awarded each year to an outstanding student entering the doctoral program in economics. The Robert R. Wilson Fellowship in the Department of Political Science is awarded to a student currently enrolled in or entering a doctoral program in international law, international organization, or international relations. This endowed fellowship is administered by the Department of Political Science. The Gertrude Weil Fellowship, administered by the Department of Religion, is awarded to students interested in Judaic studies. The John L. Lievsay Fellowship is awarded to a student in English literature.

Graduate Fellowships. Graduate fellowships funded by Duke University are available to students in the Graduate School for study during the academic year. Stipends, which include tuition, range from \$7,832 for the academic year to \$15,000 for a full calendar year. In 1984-85, 279 students held these fellowships.

Federal Fellowships.* Duke University participates in the following programs:

*United States citizenship is generally a requirement for eligibility.

National Science Foundation Fellowships. A number of students hold National Science Foundation Graduate Fellowships which provide tuition plus a stipend of \$11,000.

Other federal programs support fellowships, traineeships, and research assistantships through departmental auspices. Approximately 300 students were supported through these programs during 1984-85.

Fellowships in Medieval and Renaissance Studies. Three fellowships are awarded annually by the Duke University Committee on Medieval and Renaissance Studies. Fellows are chosen from among students enrolled in Ph.D. programs. They receive full tuition, plus a monthly stipend of \$511 for nine months, and may request two renewals of the appointment.

Special Fellowships. The following special fellowships are available to qualified Duke students from sources outside the University:

Shell Fellowships in African Studies. Fellowships are available to qualified students in social sciences who are preparing for careers in the State Department, including the foreign services of the United States, the United Nations, or other international agencies, or in research and teaching in international affairs in academic institutions within the United States. They must be citizens of the United States or residing permanently in the United States and intending to become citizens. The fellowships are intended to cover the expenses of field research in the preparation of doctoral dissertations. The stipend for each fellowship is \$4,000 plus a reasonable amount for transportation expenses. Inquiries should be made to the Administrative Assistant, Center for International Studies, 2101 Campus Drive, Durham, North Carolina 27706.

Exchange Fellowships with the Free University of Berlin. Fellowships are available through an exchange arrangement with the Free University of Berlin which will provide a fellowship for one graduate student to study during the regular academic year in Berlin. Interested students should write to the Dean of the Graduate School prior to February 1.

Special Graduate Fellowships for Minority Students. These fellowships provide for payment of tuition plus a stipend of \$5,400. They are awarded for one year to qualified applicants upon the recommendation of the departments.

International Studies Fellowships. International Studies Fellowships are intended for students from foreign countries who have completed their undergraduate education in institutions outside the United States. Students who are concentrating their programs in areas that may be broadly defined as international studies, who have the Ph.D. as their objective, and who are eligible for admission to the Graduate School may be considered.

Awardees are chosen competitively from departmental nominees, and selection is based upon the academic merit of the individual. The James B. Duke fund provides a stipend payment of \$916.67 per month for twelve months for a total stipend of \$11,000 for each fellowship year. In addition, the fellowship provides payment of tuition and health fees.

Departmental Fellowships. Various departments and schools within Duke University have fellowships which are available to students pursuing graduate study. Information may be obtained from the individual departments.

Graduate Scholarships. Graduate scholarships funded by Duke University are available to students in many departments of the Graduate School for study during the academic year. Awards are for full or partial payment of tuition; they range in value to \$7,890. In 1984-85, 144 students held graduate scholarships.

Assistantships

Graduate Assistantships. Appointments as graduate assistants carry a total stipend of up to \$6,976 for the academic year. The value of the stipend is determined by

the time spent in assisting, the qualifications of the assistant, and the nature of the work assigned. Graduate assistants also may receive scholarships or fellowships in addition to payments for service as an assistant. In 1984-85, 190 students held graduate assistantships.

Research Assistantships. Appointments are for predoctoral candidates whose special training and qualifications enable them to serve as assistants to individual staff members in certain departments. Stipends may be up to \$8,400, depending on the nature of the assistance and the assisting time required. In 1984-85, approximately 186 students held research assistantships.

Part-time Instruction. Several departments offering graduate work have exceptionally qualified graduate students work as part-time instructors, tutors, and teaching assistants. These students may qualify to reduce their registration to 9 or 12 units per semester.

Payment of Awards

The payment of income stipends to graduate assistants starts on September 25 and is made in equal payments on the twenty-fifth day of each month thereafter. Fellowship or scholarship stipends for which no service is required beyond that required of all students in a program start on September 30 and are made in equal payments on the last working day of each month.

Stipends awarded under fellowships and scholarships are not subject to income or social security tax; however, awards to graduate assistants having teaching or research assignments may be subject to both. The Graduate School office will supply detailed information.

It is the responsibility of the student to be sure that tuition and fees are paid or that arrangements have been made with the appropriate office or department for submission of tuition payment notices to the Bursar (101 Allen Building). Graduate students should contact either the Director of Graduate Studies in their department or the Graduate School Financial Aid Coordinator (123 Allen Building) depending upon the type of award. Faculty, senior administrative staff, employees, and eligible spouses, not in degree programs, should contact Harrison Brooke (303 Allen Building) regarding tuition benefits.

Loans

Students who anticipate a need to supplement their financial resources through loans or college work-study employment should obtain and complete a Graduate and Professional Student Financial Aid Service (GAPSFAS) form. These forms are available at most financial aid offices or from the Financial Aid Coordinator, Graduate School, Duke University, Durham, North Carolina 27706. A student seeking a loan should contact his or her state lending agency.

It is the policy of the Graduate School to provide loans through the University to help students meet their educational expenses. Only students with full-time status who meet the federal criteria for need are eligible for loans. Loan funds are provided through the National Direct Student Loan Program after a student has borrowed the maximum from the Guaranteed Student Loan Program. Generally, loans made from these funds, or in the case of loans from state agencies, bear no interest charge to qualified borrowers while they maintain student status and for a short period thereafter. Interest during the repayment period is at a favorable rate. The maximum amount of a loan through Duke for first-year graduate students is limited to \$5,000. Proof of eligibility for state loans is less demanding and more favorable to the borrower.

Inquiries concerning loans should indicate the department of intended matriculation and include all pertinent information concerning application to a state agency.

These inquiries should be addressed to the Financial Aid Coordinator, Graduate School, Duke University, Durham, North Carolina 27706.

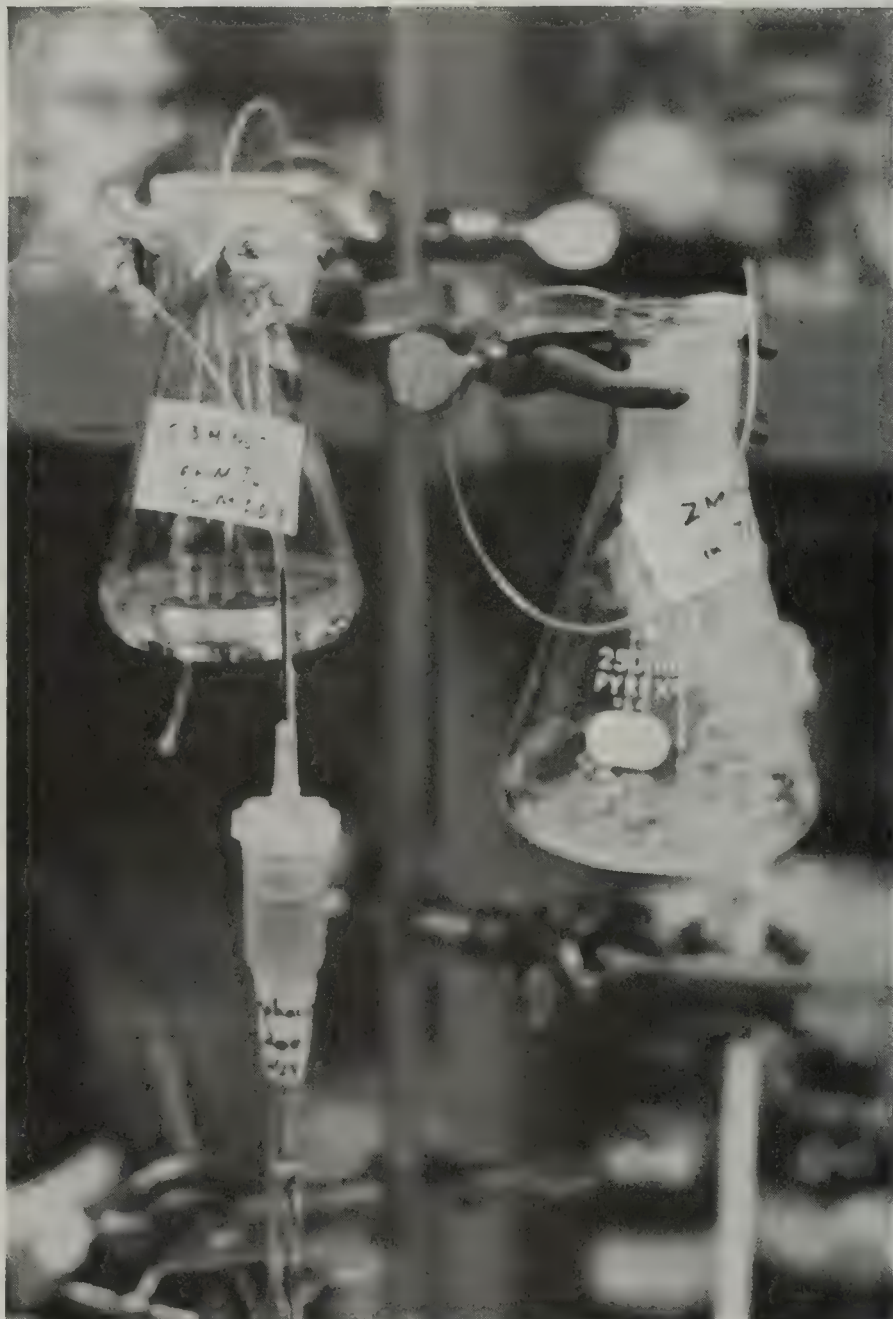
Work-Study Program Employment

Funds are available through the college work-study program for short-term or part-time employment of graduate students. A student who wishes to apply for work-study must complete a GAPS FAS form. Students considering the possibility of work-study for the fall should submit GAPS FAS forms by April 15, if possible. Eligibility requirements are similar to those of the federal loan programs. In addition to departmental employment opportunities, the placement office maintains a listing of employment openings for students.

Summer Financial Aid

A limited amount of financial aid is available to students in summer study. Summer financial aid, determined according to demonstrated need, may consist of institutional grant funds and/or low interest loans from the Federally Insured Student Loan program and the National Direct Student Loan program. To qualify for summer school aid, a student must be enrolled or accepted for enrollment at Duke during the academic year immediately preceding the summer for which aid is requested. (Students enrolled only for the summer may be eligible to borrow from outside lenders under the Federally Insured/Guaranteed Loan program in their home states or from the schools at which they are regularly enrolled. They should contact their college's financial aid office or the state's department of higher education for information and applications.) The college work-study aid is determined by the financial aid office based upon the student's financial need and the availability of funds. Graduate awards are determined by departments depending on usual criteria and availability of funds.

Registration and Regulations



Registration for Students Matriculating in Fall 1985

All new students for the fall semester 1985 must register each fall and spring semester for credit toward their degrees and pay a registration fee each semester unless waived by an approved leave of absence granted by the Dean. Doctoral students are expected to register for 60 units of degree credit. After the 60 units of degree credit have been achieved, the student will continue to pay only the registration fee each semester until all degree requirements have been met. A master's student (except for those students enrolled in the two-year health administration, physical therapy, and public policy studies programs) will register for a minimum of 30 units of degree credit and for any course units beyond the 30 required of their program. A registration fee is charged each semester.

Approved transfer course work into a master's program will *not* reduce the minimum registration for a master's degree of 30 units at Duke University. Approved transfer of an earned master's degree will reduce the minimum doctoral registration to 45 units of degree credit at Duke University.

Full-time doctoral students will register at the rate of either 9 units as a teaching or research assistant or 12 units each semester until 60 units of degree credit have been completed. Part-time doctoral students will register for a minimum of 3 units per semester. One year (two semesters of an academic year) of 9 or more units each semester is required to meet the residence requirements for the Ph.D. degree. Master's degree students who study full-time will register for 9 units as a teaching or research assistant or 12 units each semester until the 30 unit course requirements have been completed. Part-time students may register for 3 units each semester until the 30 unit requirements have been completed.

Except for these registration procedures, all other degree regulations remain as stated in the other sections of this bulletin.

Registration for All Students Enrolled Prior to 1985-86

Who Must Register. All students who are enrolled in the Graduate School in any program and who have not been granted a leave of absence by the Dean must register each fall and spring until all degree requirements are completed.

Registration Periods. After receiving notification of admission to the Graduate School and returning a statement of acceptance of admission, the student must register for the term indicated in the admission letter.

Fall and Spring. A newly admitted graduate student first confers with the Director of Graduate Studies of the major department, who signs a course card listing the

course work to be taken. The student then presents this course card to registration officials for enrollment in the selected courses and pays tuition and fees, or verifies that tuition and fees have been paid if he or she has an award, in the Bursar's office (101 Allen Building). See payment policies in the chapter "Financial Information."

After the first registration, a student must register for subsequent semesters at the regular stated time for registration. Currently enrolled students who fail to register at the first scheduled registration period for the subsequent semester incur a penalty for late registration. A former student who has been on leave of absence and who intends to register to resume a degree program must give the department and the Dean notice of this intention two months before registration.

Late Registration. All students are expected to register at the times specified by the University. A late registration fee of \$25 is charged any student registering late, including a current student who delays registering until the special registration for new students.

Change of Registration. During the first two weeks of the fall or spring semester, registration may be changed with the approval of the Director of Graduate Studies, if no reduction of fee is entailed. If fees are to be refunded, the approval of the Dean of the Graduate School is required. For the succeeding two weeks, courses may be dropped and equivalent hours of research or residence credit added with the approval of the Director of Graduate Studies, the instructor of the course, and the Dean. Students who pass the preliminary examination during the first four weeks of the fall or spring semester may alter their registration, with fee adjustments, at any time during that period.

Summer. Students who are in residence at Duke University during the spring and who plan to enroll for courses or research in the summer session may have their course programs approved by the Director of Graduate Studies during the week of Graduate School registration in March. Course cards for courses or graded research should be submitted in the Office of the Summer Session. Summer session students may register in the summer session office at any time beginning with the March registration period and up to the Wednesday preceding the start of the appropriate term. Graduate students who are in residence during the spring and who intend to remain in residence during one or more of the summer session terms without registering for course work must register for 1 unit of research with the Graduate School.

Duke graduate students who are registered *in absentia* for the spring may register for the summer session by mail, provided they are in good academic standing or have received permission from the appropriate Director of Graduate Studies.

Students who are not in residence at Duke during the spring (newly admitted students to the Graduate School and students of other colleges and universities desiring to earn credits for transfer) may register by mail for the summer session. Advance registration by mail includes:

1. Completion of the summer session application. (Applications may be obtained by writing to the Office of the Summer Session, 121 Allen Building.)
2. Admission to the summer session by the Director of the Summer Session. (Students who have been admitted to the Graduate School for the summer term need not apply to the summer session.)
3. Submission of a properly approved and completed course card in the Office of the Summer Session.

The University does not mail statements for summer session tuition and fees. All tuition and fees should be paid in the Office of the Bursar (101 Allen Building) at least *five full working days* prior to the first day of class (see summer session calendar). Students who fail to register and pay all tuition and fees before this deadline will be assessed a late charge. Students registering by mail may forward payment to the Office of the Bursar, 101 Allen Building, Duke University, Durham, North Carolina

27706. Failure to pay tuition and fees by the end of the drop/add period will result in administrative withdrawal of the student. Withdrawn students may not attend class or subsequently be registered for the term.

After April 30 all course changes must be approved by the appropriate director of graduate studies. The Director of the Summer Session serves as the dean for all non-Duke students. Course changes are accomplished by submitting the three-part add/drop form(s) to the Office of the Summer Session, 121 Allen Building. Students who are out of town must contact their director of graduate studies directly to arrange for dropping or adding courses.

ADDING: Students may add a course or courses before or during the first three days of the term. (See also the section on late registration and payment, above.) After the third day of the term, no course may be added.

DROPPING: Prior to the first day of the term, students may drop a course or courses for which they have registered (course card submitted) without penalty. During the first three days of the term, students will be charged 20 percent of the tuition for dropping a course or courses if this results in any reduction of tuition (not offset by adding a course or courses).

With the permission of the director of graduate studies a course may be dropped until the end of the fourteenth day of a regular summer term (eleventh day at the Marine Laboratory); the instructor then assigns a *WP* or *WF* grade. Course work discontinued without permission will be assigned a *WF* or a *WE* upon the approval of the Dean of the Graduate School. (See also the section on withdrawal charges and refunds in the chapter "Financial Information.")

Since summer session courses present a program of study in more concentrated and rapid form than in the fall or spring, students are advised to register on time and to be present at all class sessions.

General Academic Regulations

Residence. Although graduate study consists principally of individual reading, research, and laboratory experimentation under guidance, academic progress in the United States is generally measured and recorded in terms of course hours and credits. Credit for courses, seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. One unit is equivalent to one semester hour. The term *residence* designates full-time study and research in close proximity to the facilities provided, as opposed to part-time study incidental to a full-time occupation. For purposes of satisfying the residence requirement of the Ph.D. degree, residence of one year is defined as two successive academic semesters of no fewer than 9 units each semester. Each student who receives financial assistance from the University must register for a full program (9 units or more) until the preliminary examination is passed. Part-time students receive no financial assistance from the University. The minimum registration for students in an approved part-time program is 3 units per semester until the preliminary examination is passed. However, part-time students must fulfill the minimum full-time residence requirement of one academic year (registration of 9 units or more during two consecutive semesters) in order to complete Ph.D. degree requirements. No residence credit can be accepted toward the requirement for the Ph.D. degree for work completed during the summer session; however, registration during the summer will apply toward the requirement of 60 units. All work required for the master's degree must be completed within six years of the date of matriculation. The six-year time limitation also applies to master's candidates engaged solely in summer study. A student who completes all degree requirements during the summer session will be granted the degree in September.

Course Load. Graduate students are considered fully registered when they enroll for the number of credits their programs require. Required registration is set in consideration of a student's obligation to teach or assist and of a student's progress toward fulfilling degree requirements. In the academic year normal registration for the *resident doctoral* student who does not hold an appointment as part-time instructor or assistant and does not engage in part-time work, is 15 units a semester or 30 units an academic year. The registration for *resident doctoral* students who hold such appointments or undertake such work is either 12 units or a minimum of 9 units, depending upon the number of hours a week they are required to devote to such duties. Resident doctoral students who receive financial assistance from the University carry full registration through the semester in which they pass the preliminary examination. Part-time Ph.D. students who have completed the minimum residence requirement of one full-time academic year may continue to register for a minimum of 3 units per semester until they pass the preliminary examination. All Ph.D. students who have completed the residence requirement and passed the preliminary examination and remain at Duke continue to register for a minimum of 3 units each semester until the dissertation is accepted. Those who choose to go away from the University must register for 1 unit each semester *in absentia* in order to keep their programs active.

In the academic year normal registration for the master's student who does not hold an appointment as a part-time instructor or assistant and does not engage in part-time work is 15 units a semester or 30 units an academic year. A student who has completed all requirements except a thesis and has not matriculated in a doctoral program at Duke may register for as few as 3 units per semester. If the student decides to go away from the University, he or she may register for 1 unit *in absentia* until a minimum of 30 units is completed. A student in a master's program requiring no thesis may choose to take courses in addition to the required 24 units of graded work or register according to the pattern of 3 units at Duke or 1 unit *in absentia* as necessary for departmental requirements in lieu of a thesis to complete the minimum requirements of 30 units.

The registration of 1 unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor.

It is necessary to be a fully registered student according to the regulations listed above in order to establish eligibility for library carrel and laboratory space, student housing, University and some outside loans, and the Student Health Service, including accident and sickness insurance. See the chapter "Student Life."

Standards of Satisfactory Progress in Graduate Degree Programs. A graduate student is expected to make satisfactory progress in his or her program in order to remain enrolled in a degree program or to receive financial aid. (See the section on grades in this chapter.) A student is considered to be making satisfactory progress if he or she is eligible to continue during the academic year. Full-time graduate students who have not passed doctoral preliminary examinations register for 15 units each semester unless they hold assistantships or are in specified programs which permit the reduction of their course load to 12 or 9 units each semester. Full-time doctoral candidates who have passed the preliminary examination register for at least 3 units each semester. Assistantships, scholarships, and fellowships through Duke University are not available to part-time students. Part-time graduate students must be enrolled for at least 8 units each semester in order to qualify for loans (National Direct Student Loan, Guaranteed Student Loan). (See the section on course load, above, for definitions of full-time and part-time students.) Determination of academic load is made at the end of the drop/add period for each semester. If hours are reduced below these levels, the Graduate School Financial Aid Office must be notified and some monies or types of aid may have to be repaid. The student should contact the Financial Aid Office if this situation is contemplated or occurs.

Part-time Graduate Study. The regulations of the Graduate School permit part-time study provided the student meets the minimum registration requirements for the degree program. For students pursuing a master's degree, the minimum registration requirement is 3 units each semester. The Ph.D. program requires a minimum of one year of full-time residence.

Summer Session. In each term of the summer session, students may register for a maximum of two courses. A student who wishes to register for more than two courses must obtain the approval of the appropriate Director of Graduate Studies. Unclassified students must obtain approval from the Director of the Summer Session. Students who are in residence during the academic year and wish to continue study and to use University facilities, including the Student Health Service, during the summer, must register for 1 unit in the first summer session term. This registration provides use of facilities for both terms of the summer session.

Credits. The following regulations pertain to credits earned outside the Duke University Graduate School:

Graduate Credit Earned before the A.B. Degree Is Granted. Ordinarily no credit will be allowed for graduate courses taken before a student has been awarded the A.B. or B.S. degree. However, an undergraduate student at Duke University, who at the beginning of the final semester lacks no more than three courses in order to fulfill the requirements of the bachelor's degree, may apply for admission to the Graduate School for that final semester. If the student meets the requirements for admission, permission may be obtained from the Dean of the Graduate School to enroll for graduate courses to bring the total program to no more than five courses. In addition to undergraduate registration, the student must register in the Graduate School at the beginning of the semester in which graduate credit is to be earned in order for the courses to be credited toward a graduate degree program.

Transfer of Graduate Credits. Transfer of credit for graduate course work completed at another institution will be considered only after a student has earned a minimum of 12 units of graduate study at Duke University. After completing the 12 units, the student should file a request for transfer of credits on the appropriate Graduate School form.

Graduate Credit for Courses Taken in the School of Law. Upon recommendation of the Director of Graduate Studies, and approval of the Dean of the Graduate School, a student in the social sciences may take certain courses in the School of Law for graduate credit. In some instances, courses in the School of Law may be considered as fulfilling requirements for related work. To register for such courses, a student should present a letter from the Director of Graduate Studies in the major department to the Dean of the School of Law requesting permission to register for specific courses.

Summer Session Credit. Summer session *credit* does not mean degree credit at Duke University unless the student has been admitted as a degree candidate by one of the colleges or schools of the University. The majority of summer session courses carry 3 units of credit and require one term of residence. A student taking a course for credit is expected to do all the work required and to take the final examination, and will receive a grade. (G.I. Bill benefits are available only to those veterans who enroll for credit.)

For regulations concerning the application of graduate credit to a degree program at Duke, earned by a student (not undergraduate) while attending the Duke summer session, see the section on transfer of graduate credit in this chapter.

Reciprocal or Interinstitutional Agreements with Neighboring Universities. Under a plan of cooperation between Duke University and the University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University at Raleigh, students properly enrolled in the Graduate School of Duke

University during the regular academic year, and paying full fees to this institution, may be admitted to a maximum of two courses per semester at one of the other institutions in the cooperative plan. A doctoral student who has passed the preliminary examination and registers for a minimum of 3 units at Duke may register for 3 to 6 additional units at the other institution. Under the same arrangement, students in the graduate schools in the neighboring institutions may be admitted to course work at Duke University. Credit so earned is not defined as transfer credit. To take advantage of this arrangement during any summer session term, the student registers each term for 3 units of credit at the home institution and 3 units of credit at the other institution, for a total of 6 units. All interinstitutional registrations involving extra-fee courses or special fees required of all students will be made at the expense of the student and will not be considered a part of the Duke University tuition coverage. This reciprocal agreement does not apply to contract programs such as the American Dance Festival.

Identification Cards. Graduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee. The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of a card immediately to the Registrar's office. The cost of a new ID card is \$5.

Grades. Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (exceptional) is the highest mark; *G* (good) and *S* (satisfactory) are the remaining passing marks; *F* (failing) is an unsatisfactory grade; and *I* (incomplete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time grades are reported. For students enrolled in the Graduate School, the instructor who gives an *I* for a course specifies the date by which the student must make up the deficiency. For unclassified graduate students enrolled in the summer session, a temporary *I* for a course may be assigned after the student has submitted a written request that this be done. If the request is approved by the instructor of the course, then the student must satisfactorily complete the work prior to the last day of classes of the subsequent summer term. If the course is not completed in one calendar year from the date the course ended in the case of students enrolled in the Graduate School, or in the case of unclassified graduate students, the grade of *I* becomes permanent and may not be removed from the student's record. The grade of *Z* indicates satisfactory progress at the end of the first semester of a two-semester course. A grade of *F* in a major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in any other course occasions academic probation.

Courses Primarily for Undergraduates. Students granted provisional admission and others whose preparation is found deficient may occasionally be required, as part of their programs, to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student carry no credit toward a degree.

In exceptional cases, 100-level courses outside the major department may be taken for degree credit to a maximum of two one-semester courses or one year course not exceeding a total of 8 units, when approved by the Director of Graduate Studies in the major department and in the department in which the course is listed, and by the supervisor of the program. In order to receive credit for any such undergraduate work, the graduate student must earn a grade of at least *B*. Graduate students registering for undergraduate courses will be assessed 3 units for a nonlaboratory course and 4 units for a laboratory course.

Withdrawal from a Course. For permissible changes during the first four weeks of the fall or spring semester and during the first two weeks of a summer session term, see the section on change of registration in this chapter. If a course is dropped without the necessary approval, the permanent record will, at the discretion of the Dean of the Graduate School and with the permission of the instructor, list the course as withdrawal error (WE). If a course is dropped after the four-week period during the fall or spring or after the first three days of classes during the summer, the status of the student at the time of withdrawal from the course will be determined and indicated on the permanent record as *Withdrew Passing* (WP) or *Withdrew Failing* (WF).

Interruption of Program and Withdrawal from the Graduate School. Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

The University reserves the right, and matriculation by the student is a concession at this right, to request the withdrawal of any student whose academic performance at any time is not satisfactory to the University. A student who wishes for any reason to withdraw from the Graduate School during the fall or spring should notify in writing both the Director of Graduate Studies in the major department and the Dean of the Graduate School prior to the date of the expected withdrawal. If students wish to withdraw from the summer session, they must consult both the Dean of the school or college in which they are registered and the Director of the Summer Session. For refunds upon withdrawal, see the section on tuition and fees in the chapter "Financial Information."

A student who, after successfully completing one semester of graduate study, must withdraw before completion of a graduate program may, with the approval of the major department, request the Dean to issue a certificate of graduate study.

Leave of Absence. A leave of absence for a period of time no longer than one calendar year may be granted because of medical necessity, full-time employment at Duke University, acceptance of an external award judged likely to benefit the student as an individual but not related to the degree requirements, or other acceptable reasons. A request for a leave of absence should be originated by the student, endorsed by the student's major professor and Director of Graduate Studies, and submitted to the Dean of the Graduate School for consideration. A student is eligible to request a leave of absence only after having completed at least one semester at Duke. Time limitations which pertain to the various degrees and the completion of courses on which a grade of *I* (incomplete) was earned are not waived.

Size and Make-up of Classes. Classes which carry graduate credit are limited in size to thirty students. In exceptional cases this regulation may be modified, but only by permission of the Dean of the Graduate School. Courses numbered from 200 through 299 may have not only graduate students enrolled, but also an unspecified number of sophomores, juniors, and seniors. Undergraduate students are not permitted to enroll in courses of 300 level or above.

Language Requirements. *Master's Degrees.* The Graduate School has no foreign language requirement for any of the master's degrees. Individual departments may, however, require foreign language proficiency. See individual departmental sections in this bulletin or contact the appropriate Director of Graduate Studies to determine specific requirements.

Ph.D. Degrees. The regulations of the Graduate School require a reading knowledge of one foreign language for the Ph.D. degree. However, some departments have been granted a waiver of the requirement, and other departments require two foreign

languages. See individual department sections in this bulletin or contact the appropriate Director of Graduate Studies to determine specific requirements.

The languages usually required are French, German, or Russian. With the approval of the Director of Graduate Studies in his or her department, a student may substitute another language which has a definite relation to the degree program and for which an examination can be provided. A foreign student whose native language is not English may request that the Director of Graduate Studies in the major department ask permission of the Dean of the Graduate School to offer English for the foreign language required for the degree.

To avoid unnecessary delays, prospective students should anticipate the language requirement of their degree programs. For example, a student whose program requires a knowledge of French, German, Russian, or Spanish is urged to take the appropriate Graduate School Foreign Language Test (GSFLT) prior to registration.

Meeting the Requirement. The foreign language requirement may be satisfied in the following ways:

1. The student may take one of the GSFLT examinations administered to undergraduate and graduate students at many national centers (including Duke University Counseling and Psychological Services) prior to matriculation in the Graduate School. Enrolled students must take the GSFLT examinations administered at Duke. It should be noted, however, that at the time of the final examination in a master's program or of the preliminary examination in a doctoral program, language examinations more than six calendar years old will not be accepted toward fulfilling the language requirement.
2. With the permission of the Dean of the Graduate School, the Director of Graduate Studies may request acceptance of a language examination passed prior to the student's enrollment at Duke. The student should request that a transcript or other certification that the language examination was passed be sent to the Graduate School for approval. Requirements are (a) that only one language of a doctoral requirement be met in this way, (b) that the other institution offer a doctoral program in the student's major and the examination would have met a doctoral requirement there, and (c) that the examination must have been passed no more than five years before first registration at Duke.
3. In a language for which GSFLT tests are not available, a reading examination may be arranged by the Graduate School office and administered by a qualified examiner.

Requirements for Foreign Students. Foreign students whose native language is not English are required to take a test for minimum competence in English. Such students, with the approval of the Director of Graduate Studies in their major department, may request permission of the Dean of the Graduate School to substitute English for the one foreign language required in the master's or doctoral program. See the section on procedures for foreign students in the chapter "Admission."

Special Language Courses. Special courses designed to assist graduate students in acquiring a reading knowledge of French or German are offered for three hours a week during the fall and spring. Special language reading courses and language courses numbered below 200 carry no credit toward a degree. Auditors are not permitted in these courses. Undergraduates may not enroll in these special courses during the academic year but may register in the summer with permission of the Dean of the Graduate School, provided space is available after graduate students have been enrolled.

Degree Regulations—The Master's Degrees

MASTER OF ARTS

Prerequisites. As a prerequisite to graduate study in the major subjects, a student must have completed a minimum of 24 undergraduate semester hours—ordinarily 12 semester hours of approved college courses in the major subject and 12 semester hours in the major or in related work. Since some departments require more than 12 semester hours in the proposed field of study, students should read carefully the special requirements listed by their major departments in the chapter “Courses of Instruction.” If special master's requirements are not specified in this section and there is a question about the prerequisite, prospective students should write directly to the appropriate Director of Graduate Studies.

Language Requirements. The Graduate School requires no foreign language for the master's degree. Certain departments, however, do have language requirements and these must be satisfied before the master's examination can be taken. See the departmental listings in the chapter “Courses of Instruction.”

Major and Related Subjects. Thirty units of graduate credit at Duke constitutes minimum enrollment for the Master of Arts degree. The students must present acceptable grades for a minimum of 24 units of course work, 12 of which must be in the major subject. A minimum of 6 units must be in a minor subject or in related fields which are approved by the student's major department. The remaining 6 units of the required 24 may be taken either in the major or in related fields approved by the major department and the Dean of the Graduate School. A maximum of 6 units may be earned either by submission of an approved thesis, or by completing courses or other academic activities approved by the student's department.

Completing the Program with Thesis. All basic requirements for preparing the thesis are described in the *Guide for the Preparation of Theses and Dissertations*, available in the Graduate School office.

Four typewritten copies of the thesis bound in snap binders, which may be secured through the Graduate School office, must be submitted in an approved form to the Dean of the Graduate School on or before April 15 for a May degree, one week before the final day of the Duke University second summer term for a September degree, one week before the final day of the fall semester for a December degree, and at least one week before the scheduled date of the final examination. The copies then will be distributed by the student to the several members of the examining committee. Two copies for the library and one copy for the adviser will be bound upon payment of the University binding fee of \$22.50.

Completing the Program without Thesis. Individual departments decide the options with which a Master of Arts degree may be completed without presentation of a thesis. The student's committee usually outlines the requirements for a degree program after the student has completed at least 9 units of graded course work. Beyond the 24 units required in major or related course work, 6 units may be earned either through course work or through other academic activities approved by the student's department and committee. Such academic exercises might include an additional 3 units of graded course work complemented, for example, by the following: (1) passing an oral examination on a three- to five-page research prospectus, plus a substantial bibliography on a topic within the student's major field, or (2) submission to the committee of two carefully revised term papers, preferably written originally for different instructors and earning a grade of G or higher. In any case, the student's total minimum registration will be for 30 units of graduate credit at Duke University followed by a final examination.

The Examining Committee and the Examination. The faculty member who directs the student's program recommends an examining committee composed of himself or herself and two other members of the graduate faculty, one of whom usually must be from a department other than the major department. If the student has been permitted to take related work within the major department, the third member may be chosen from within the department. Nominations for membership on this committee are submitted for approval to the Dean of the Graduate School at least one week preceding the final examination.

The committee will conduct the examination and certify the student's success or failure by signing the card provided by the Graduate School office. This card indicates completion of all requirements for the degree. If a thesis is presented, the committee members also sign all copies of the thesis, and the candidate then returns the original and first two copies to the Graduate School office.

Filing the Intention to Graduate. On or before *February 1* for a May degree, on or before *August 1* for a September degree, or on or before *December 1* for a December degree, and at least one month prior to the final examination, the student must file in the Office of the Graduate School, on the official form, a declaration of intention to graduate. The declaration of intention presents the title of the thesis or specifies alternative academic exercises on which the degree candidate will be examined. The declaration must have the approval of both the Director of Graduate Studies in the major department and the chairman of the student's advisory committee.

MASTER OF SCIENCE

Prerequisites. A bachelor's degree is a prerequisite for the M.S. degree. Departments offering an M.S. degree consider for admission students from allied fields provided they have satisfactory scientific and mathematical backgrounds.

Language Requirements. There is no foreign language requirement in Master of Science degree programs.

Major and Related Subjects. Thirty units of graduate credit at Duke constitutes minimum enrollment for the Master of Science degree. The student must present acceptable grades for a minimum of 24 units of graduate courses. Of these, at least 12 units must be in the major subject. A minimum of 6 units must be in a minor subject or in related fields which are approved by the student's major department. The remaining 6 units of the required 24 may be taken either in the major or in related fields approved by the major department and by the Dean of the Graduate School. A maximum of 6 units may be earned either by submission of an approved thesis, or by completing courses or other academic activities approved by the student's department. As other requirements vary according to the department, please consult the chapter "Courses of Instruction" for further information.

Thesis and Examination. Some departments require a thesis; all departments require an examination. The regulations and options for theses and other means of completing the program, as well as the provisions for examination and the examining committee, are the same as the requirements for the Master of Arts degree.

MASTER OF HEALTH ADMINISTRATION

Prerequisites. Students with any undergraduate major may apply. Algebra at the college level is the only prerequisite, and a special course is available each summer for students whose preparation in mathematics is inadequate or out of date.

Major Subjects. The Master of Health Administration requires a minimum of 60 units of graduate credit. The program is designed around a core of courses in health services and management sciences, medical care, economics, quantitative decision

making, law, and policy. The curriculum offers a wide range of elective courses including planning, financial management, personnel, organizational development and behavior, information management, and current topics in health administration. The academic program is four semesters in length. Upon completing the degree, a student without prior experience usually elects to take a nine- to twelve-month administrative residency during which a salary is received.

Additional Master's Regulations

Transfer of Credits. A maximum of 6 units of graduate credit may be transferred for graduate courses completed at other institutions. Such units will be transferred only if the student has received a grade of *B* (or its equivalent) or better. The transfer of graduate credit does not reduce the required minimum registration of 30 units for a master's degree at Duke. Requests for transfer should be submitted on the approved Graduate School form (T1).

A student who is granted such transfer credit may be permitted to register for as much as 12 units of thesis research instead of the usual 6 units. As another option, a student may take as many as 6 units of further undergraduate training or 6 units of required language courses on the undergraduate level. In no case will credit be allowed for extension or correspondence courses.

Nondegree Students. A student may apply to the Graduate School as a nondegree student or may register for a graduate course through the Office of Continuing Education as a nondegree student. In order to change to a degree program in the Graduate School, the nondegree student will need to make a formal application for admission to a degree program in the Graduate School.

Credit for graduate courses taken at Duke by a student (not undergraduate) before admission to the Graduate School or while registered as a nondegree student through the Office of Continuing Education or the Graduate School may be carried over into a graduate degree program if: (1) the action is recommended by the student's Director of Graduate Studies and approved by the Dean, (2) the amount of such credit does not exceed 12 units, (3) the work has received grades of *G* or better, and (4) the work is not more than two years old.

Time Limits for Completion of Master's Degrees. Master's degree candidates who are in residence for consecutive academic years should complete all requirements for the degree *within two calendar years* from the date of their first registration in the Graduate School. Candidates must complete all requirements *within six calendar years of their first registration*.

To be awarded a degree in May, the recording of transfer credit must be completed by the first day of the final examination period and all other requirements must be completed by the last day of the final examination period. If a thesis is one of the requirements, it must be submitted to the Graduate School office no later than April 15. Candidates desiring to have their degrees conferred on September 1 must have completed all requirements, including the recording of transfer of credit, by the final day of the Duke University summer session. Candidates completing degree requirements after that date and during the fall will have their degrees conferred on December 30.

The Thesis. The thesis should demonstrate the student's ability to collect, arrange, interpret, and report pertinent material on a research problem. The thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures. Requirements of form are set forth in the *Duke University Guide for the Preparation of Theses and Dissertations*, copies of which are available in the Graduate School Office.

Degree Regulations—The Doctoral Degree

Requirements. The formal requirements for the Ph.D. degree are as follows: (1) major and related courses, (2) foreign language(s) in many departments, (3) a supervisory committee for the student's program of study, (4) residence, (5) preliminary examination, (6) dissertation, and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passing grades in all course work and a grade of C or better on at least 9 units of this course work.

Major and Related Work. The student's program of study demands substantial concentration on courses in the major department. However, a minimum of 6 units in a related field approved by the major department must be included. A few programs have been authorized by the Executive Committee of the Graduate Faculty to utilize courses in fields within the major department in fulfilling the related field requirement. If there are deficiencies in a student's undergraduate program, departments may require certain undergraduate courses to be taken for which the student will not receive degree credit. In all cases the student's supervisory committee will determine what requirements above the minimum, if any, the student must meet.

Foreign Languages. The regulations of the Graduate School require a reading knowledge of one foreign language for the Ph.D. Some departments require two languages; other departments have received approval from the Dean and the Executive Committee of the Graduate Faculty to waive the foreign language requirement. For specific departmental requirements, see individual departmental sections in this bulletin or contact the appropriate Director of Graduate Studies.

Students working toward the doctoral degree should complete any language requirements set by their departments by the end of their first year of residence. Those who fail to meet the requirement by the end of their third semester of residence should register in the appropriate special reading course. Any foreign language requirement must be met before the preliminary examination is taken.

Committee to Supervise the Program of Study. As early in a student's course of study as is practicable and *not later than two months before the preliminary examination*, the Director of Graduate Studies in the major department will nominate for the approval of the Dean a supervising committee consisting of five members, with one member designated as chairman. This committee will include at least three graduate faculty members of the major department and, usually, at least one from outside of the department. For programs in which approval has been granted for related work from a clearly differentiated division within the department, one member of the committee will be chosen from that division. This committee, with all members participating, will determine a program of study and administer the preliminary examination. The preliminary examination must be administered by all five members of the student's committee.

Residence. The *minimum* full-time residence requirement is one academic year (two consecutive semesters in the same academic year) at Duke. The *minimum* registration requirement is 60 units of graduate credit, of which not more than 30 units of a completed master's degree may be accepted by transfer. The transfer of credit will not reduce the minimum requirement of one full-time academic year at Duke. (For the definition of residence, see the section on general academic regulations in this chapter.) Students who have completed the requirement will be permitted to reduce their registration to 3 units per semester after they have passed the preliminary examination.

Time Limits. Ordinarily a student should pass the preliminary examination by the end of the third year of graduate study. A student who has not passed the examination by the end of the third year of full-time registration must file with the Dean of

the Graduate School a statement, approved by the Director of Graduate Studies in the major department, explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the middle of the fourth year.

The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of the committee, may petition the Dean of the Graduate School for an extension of up to one year. If this extension is granted and the dissertation is not submitted and accepted by the new deadline, the student will be dropped from candidacy. The student must then pass a second preliminary examination to be reinstated as a candidate for the degree. In such cases, the time limit for submitting the dissertation will be determined by the Dean of the Graduate School and the candidate's committee.

In cases of particular merit, the Dean of the Graduate School may extend the limit of 6 years of total elapsed time within which credit will be allowed for courses, the language examination, and the preliminary examination. The graduate faculty of the departments will have these limits in mind when a student is considered for admission or readmission to the Ph.D. program, for approval to take the preliminary examination, and for approval to submit the dissertation and take the final examination. In instances of excessive elapsed time, revalidation of credit may be required. Responsibility for requiring such revalidation rests with the department. Proposed requirements for revalidation require the approval of the Dean of the Graduate School.

Preliminary Examination. A student is not accepted as a candidate for the Ph.D. degree until the preliminary examination has been passed at Duke. The examination ordinarily covers both the major field and related work. In the summer a preliminary examination may be scheduled only between the opening and closing dates of the summer session.

Privilege of Re-examination. A student who fails the preliminary examination may apply, with the consent of the supervisory committee and the Dean of the Graduate School, for the privilege of a second examination to be taken no earlier than three months after the date of the first. Successful completion of the second examination requires the affirmative vote of all committee members. Failure on the second examination will render a student ineligible to continue a program for the Ph.D. degree at Duke University.

Reduction in Registration. A student who passes the preliminary examination during the first four weeks of the fall and spring is eligible for a reduction in required registration and should arrange with the Graduate School office the desired changes in registration.

The Dissertation. The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

One month before the dissertation is presented and no later than *February 1* preceding the May commencement, *August 1* for a September degree, and *December 1* for a December degree, the student must file with the Dean of the Graduate School, on the official form available in the Graduate School office, the title of the dissertation. This title must receive the written approval of both the Director of Graduate Studies of the student's major department and the professor who directs the dissertation.

The basic requirements for preparing the dissertation (type of paper, form, and binding) are prescribed in the *Guide for the Preparation of Theses and Dissertations*, copies of which are available in the Graduate School office.

The dissertation must be completed to the satisfaction of the professor who directs the dissertation, members of the student's advisory committee, and the Dean of the Graduate School. Four typewritten copies, bound in snap binders which may be

secured through the Graduate School Office, must be submitted to the Dean of the Graduate School on or before *April 1* preceding the May commencement, one week before the end of the Duke summer session for a September degree, or one week before the end of the fall semester for a December degree. The dissertation must be submitted to the Graduate School office at least seven days before the scheduled date of the student's examination.

All doctoral dissertations are published on microfilm through Xerox University Microfilms, Ann Arbor, Michigan. Authors may copyright them if they wish. Abstracts are published in *Dissertation Abstracts International*.

In brief, all copies of the dissertation, the original in clean type, will remain in snap binders until after the final examination. Two extra copies of the abstract (not more than 350 words long) are submitted when the dissertation is first presented to the Graduate School office. A nonrefundable fee of \$35 is charged for microfilming. If copyright is desired, an additional fee of \$20 is charged. The original and two copies will be bound at a cost of \$22.50. A deposit of \$5 is collected for each snap binder on loan from the library used for dissertation copies that will not be bound.

Final Examination. The final examination is normally administered by the five members of the supervising committee, but it may be administered by four members of the committee if the member representing the related field is present. In either case, successful completion of the final examination requires at least four affirmative votes. The final oral examination shall be primarily on the dissertation; however, questions may be asked in the candidate's major field. Except in unusual circumstances approved by the Dean, a final examination will not be scheduled when the University is not in session.

A student who fails the final examination may be allowed to take it a second time, but no earlier than six months from the date of the first examination. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ph.D. degree at Duke University.

Deposit of the Dissertation. After passing the examination, candidates bring to the Graduate School office the original and the first two copies of the dissertation, properly signed. At this time they sign the microfilming agreement and pay microfilming and copyright fees.

Commencement

Graduation exercises are held once a year, in May, when degrees are conferred on and diplomas are issued to those students who have completed requirements by the end of the spring. Those who complete degree requirements by the end of the fall or by the end of a summer term receive diplomas dated December 30 or September 1, respectively. There is a delay in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Standards of Conduct

Duke University expects and will require of all its students cooperation in developing and maintaining high standards of scholarship and conduct.

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University currently in effect or which, from time to time, are put into effect by the appropriate authorities of the University. Students, in accepting admission, indicate their willingness to subscribe to and be governed by these rules and regulations and acknowledge the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University. University authorities will take action in accordance with due process.

Judicial Code and Procedures. In the spring of 1971, the Graduate School community ratified and adopted the following official judicial code and procedures:

I. Graduate School Judicial Code and Procedures

A. A student, by accepting admission to the Graduate School of Duke University, thereby indicates willingness to subscribe to and be governed by the rules and regulations of the University as currently are in effect or, from time to time, are put into effect by the appropriate authorities of the University, and indicates willingness to accept disciplinary action, if behavior is adjudged to be in violation of those rules or in some way unacceptable or detrimental to the University. However, a student's position of responsibility to the authorities and the regulations of the University in no way alters or modifies responsibilities in relation to civil authorities and laws.

B. A graduate student at Duke University stands in a primary and unique relation of responsibility to the faculty in the major department, the faculty upon whose recommendation a graduate degree will or will not be awarded to the student. In matters which involve or may affect the student's intellectual or professional life, the student is directly responsible to this department and its representatives, and such matters should primarily be handled by the department.

C. Actions which appear to conflict with University-wide rules and regulations will fall under the jurisdiction of the University Judicial Board.

D. A student may elect to have the Dean of the Graduate School hear matters related to the student's conduct in addition to or instead of faculty members from the student's major department, or may elect to have such matters reviewed and judged by a judicial board instead of the Dean of the Graduate School or members of the faculty in the major department. (The constitution and procedure of the judicial board are detailed below.)

E. The Director of Graduate Studies in the student's major department may request that a student's actions be reviewed by the Judicial Board or by the Dean of the Graduate School.

II. The Graduate School Judicial Board

A. *Composition.* The Graduate School Judicial Board shall have five members, serving for a period of two years: two students selected from the student body, two members of the Graduate Faculty appointed by the Executive Committee of the Graduate School, and one Associate or Assistant Dean appointed by the Dean of the Graduate School. The Board shall elect one of its members as Chairman. The Board shall have at its service a recording secretary to keep minutes of the hearings and of the Board's actions in a permanent, confidential record book. The Board will be constituted in order to hear cases in which the accused is a student currently enrolled in the Graduate School and which have been referred to it by the Director of Graduate Studies in the student's department, by the Dean of the Graduate School, or by the student himself.

B. *Preliminary Procedures.* If a student requests a hearing by the Judicial Board it must be done in writing, allowing its Chairman at least seventy-two hours to convene the Board. In addition, the Chairman shall not convene the Board until seventy-two hours after being asked to convene the Board. It is the responsibility of the Chairman of the Judicial Board fully to inform its members concerning the case and the reasons the case has been referred to the Board; and to prepare a written summary of this information for the Board, the Dean, and the student.

C. *Procedural Safeguards for the Hearing.* The Accused has the right to challenge any member of the Judicial Board on grounds of prejudice. If the Board decides to excuse one or more of its members for reasons given by the Accused, it shall consult with the Dean about the need for replacements. The Accused may choose an Adviser to assist in the defense. The accused may also produce witnesses (including no more than two character witnesses), introduce documents, and offer testimony. A person having direct knowledge relevant to a case being heard by the Board is a material witness. The Judicial Board may request the appearance of material witnesses. The Board shall also request, upon written request of the Complainant or the Accused, the appearance of material witnesses. Witnesses shall be notified of the time, place, and purpose of their appearance. The Accused has the right to examine the written statement of any witness relevant to the case at least seventy-two hours before the hearing. The Accused has the right to be faced with any witness who has given a statement relevant to the case at the hearing if the witness's attendance can be secured.



The hearing will be conducted in private unless the Accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Judicial Board shall decide the issue by majority vote. If the decision is made not to hold an open hearing, the Accused shall be informed in writing of the reasons for the decision.

The Judicial Board shall consider only the report of the Chairman, documents submitted into evidence, and the testimony of witnesses at the hearing in reaching its decisions.

D. Conduct of the Hearing. The hearing of any case shall begin with a reading of the charge by the Chairman in the presence of the Accused. The Accused shall then plead guilty or not guilty or move to terminate or postpone the hearing. The Accused may qualify a plea, admitting guilt in part and denying it in part. The Accused may not be questioned for more than one hour without recess.

At any time during the hearing, the Accused or the Judicial Board may move to terminate or to postpone the hearing or to qualify the plea or to modify its charge.

Pending verdict on charges (including appeal) against the Accused, status as a student shall not be changed, nor the right to be on campus or to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by conduct, that continued presence on the campus constitutes an immediate threat to the physical well-being or property of members of the University community or the property or orderly functioning of the University.

E. Sanctions and the Verdict. The Graduate School Judicial Board shall have the power to impose the following penalties: expulsion, dismissal from the University with the recommendation that the person never be readmitted; suspension, dismissal from the University and from participation in all University activities for a specified period of time, after which the student may apply for readmission; disciplinary probation, placing the student on a probationary status for a specified period of time, during which conviction for violation of any regulation may result in more serious disciplinary action; restitution, payment for all, or a portion of property damage caused during the commission of an offense. Restitution may be imposed by itself or in addition to any of the other penalties. The Judgment shall consist of a finding of guilty or not guilty of the charge and, when the Accused is found guilty, a statement of the punishment assessed. On all questions, including the verdict and the finding of guilty or not guilty, the Board shall be governed by a majority vote. The Judicial Board may decide to rehear a case in which significant new evidence can be introduced. In addition, the defendant may request an appeal.

F. Appeals. The appellant may submit to the Dean a written statement containing the grounds for appeal and arguments. In such cases, the Dean should determine if the appeal should be granted, and the Dean can hear the case, or refer it to the appropriate faculty in the student's department or to the Judicial Board.

An appeal shall be granted on the following grounds: procedural error substantially affecting the rights of the accused; incompatibility of the verdict with the evidence; excessive penalty not in accord with "current community standards"; new evidence of a character directly to affect the judgment but on which the original tribunal had refused a new hearing.

III. Amendment and Construction

This Judicial code and procedure and this constitution and procedure for the Graduate School Judicial Board may be amended at any time with due notice or publication by consent of the Dean, the Executive Committee, and the graduate students. Questions and problems not answered or anticipated by the foregoing may be resolved by the use of other existing institutions or by amendment.

Courses of Instruction



Course Enrollment

In general, courses with odd numbers are offered in the fall semester, those with even numbers in the spring semester. Double numbers separated by a hyphen indicate that the course is a year course and usually must be continued throughout the year if credit is to be received. A student must secure written consent from the instructor in order to receive credit for either semester of a year course. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either semester without special consent. Ordinarily, courses which bear no date are offered every year.

In each department the number 399 is reserved to designate special (individual) readings in a specified area and supervised by a regular member of the graduate staff, with credit of 1-3 units each registration, only one course per registration, and 9 units maximum in three successive registrations. The course is restricted to resident master's and doctoral programs, must have a completion exercise, and must carry a grade.

The symbol *S*, suffixed to a course number, identifies that course as a seminar.

Courses taught in 1983-84 or in 1984-85, or scheduled for 1985-86, are included in this chapter with full descriptions. Additional courses, that were taught prior to 1983-84 and that are likely to be taught in the future, are listed separately by number and title.

Anatomy

Professor Robertson, *Chairman* (466 Sands); Professor Counce, *Director of Graduate Studies* (356 Sands); Professors Cartmill, Erickson, Hall, Hylander, Kay, Moses, Nicklas, and Simons; Associate Professors Corless, Effmann, Longley, McIntosh, Reedy, and Tyrey; Assistant Professors Cant, Costello, Fitzpatrick, Garrett, Jakoi, Lamvik, Lin, MacPhee, Saling, Schachat, and Smith; Professor Emeritus Everett; Associate Professor Emeritus Duke; Assistant Medical Research Professors Beall, Kopf, Magid, Marchase, McCaslin, and Taylor; Lecturer Diamond

The Department of Anatomy offers graduate work leading to the Ph.D. degree. A common focus on the interrelations of biological structure and function characterizes the research of the anatomy faculty, although three general departmental subdivisions are recognized: biophysical, cellular, and molecular biology; neurobiology; and physical anthropology, functional morphology, and primate evolution.

The department offers doctoral training programs designed to produce teachers and research scientists competent in a broad range of the anatomical sciences, and students with a wide variety of backgrounds and interests in the biological sciences

can be accommodated within the Ph.D. program. All students participate in the core anatomical science courses (Anatomy 305, 307, 309) and gain experience in teaching over the range of departmental interests. The anatomy department is also a participating member of several interdisciplinary training programs, such as those in genetics, cell and molecular biology, neurobiology, pharmacology, and biological systems. All students are encouraged to round out their training by drawing upon anatomy courses as well as those offered by other departments in the University. Laboratories within the department are equipped for and actively support research in several areas. For further information contact the Director of Graduate Studies.

216S. Biological Psychology. C-L: Psychology 216S. 3 units. *Hall and Diamond*

217. Structure and Function of Visual Photoreceptors. A detailed study of available structural, biochemical, spectroscopic, and physiological data from retinal photoreceptors. Emphasis on molecular structure of vertebrate photoreceptor membranes, effects of bleaching on rhodopsin molecules, and initiation of neural information after photon absorption. Lectures, seminars, and demonstrations. Offered alternate years. Prerequisite: consent of instructor. Credit to be arranged; maximum 4 units. *Corless and McCaslin*

219. Molecular and Cellular Bases of Differentiation. A multidisciplinary approach stressing the molecular, cellular, and genetic processes involved in differentiation in eukaryotes. C-L: Biochemistry 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. 3 units. *Counce and staff*

220. Developmental Biology. General concepts and problems in modern developmental biology with special emphasis on cellular and subcellular events and on developmental genetics. Experimental studies in a wide range of both plant and animal species will be discussed. Intellectual continuity between early classical studies in experimental embryology and present-day developmental biology will be stressed. 3 units. *Marchase and Counce*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution. C-L: Anthropology 246S. 3 units. *Simons*

259. Molecular Biology I: Protein and Membrane Structure/Function. C-L: Biochemistry 259, Microbiology and Immunology 259, and the University Program in Cell and Molecular Biology. 3 units. *Erickson and staff*

266. Comparative Neurobiology. Prerequisite: consent of instructor. C-L: Psychology 266. 3 units. *W.C. Hall and Diamond*

269. Advanced Cell Biology. C-L: Botany 269, Microbiology and Immunology 269, the University Program in Cell and Molecular Biology, and Zoology 269. 3 units. *McIntosh and staff*

286. Electron Microscopy and Related Techniques. Lectures and laboratories on methods of ultrastructure research. Fundamentals of optics; the light microscope, phase, polarizing, and interference microscopy. Basics of electron microscopy, staining, sectioning, and replication techniques. Optical and computer image processing. Introduction to X-ray diffraction theory and apparatus in biological structure determination. Prerequisites: calculus and one year each of physics and general chemistry or consent of instructor. 4 units. *Longley*

301. Anatomy of the Limbs. This course concentrates on the musculoskeletal anatomy of the limbs and limb girdles. Emphasis is on detailed dissection of the extremities, with a minor focus on clinical applications. Course primarily intended for advanced graduate students in physical therapy. Prerequisite: consent of instructor. Fall. 1-3 units. *MacPhee*

305. Gross Human Anatomy. Includes complete dissection of a cadaver; laboratory work is supplemented by conferences which place emphasis upon biological and evolutionary aspects. Prerequisites: adequate background in biology, including comparative anatomy and embryology and written consent of instructor. Required of entering graduate students in anatomy; by arrangement, may extend into second semester. 3 units. *Staff*

307. Microscopic Anatomy. Lectures on structural organization of different tissues and organs, as determined by light and electron microscopy with emphasis on the relation of structure to function at the cellular level. The laboratory provides practical experience with light microscopy, studying and analyzing our extensive slide collection of mammalian tissues. 3 units. *Erickson and staff*

309. Neuroanatomy. Gross and basic intrinsic anatomy of the central nervous system. Later, specific systems will be emphasized; various sensory and motor, limbic-hypothalamic, and cerebral-associated mechanisms. Clinical presentations will be offered. Prerequisites: adequate background in biology, including comparative anatomy and embryology and written consent of instructor. Required of entering graduate students in anatomy; by arrangement, may extend into second semester. 2 units. *Staff*

310. Frontiers in Neurobiology. Course consists of readings, and student and faculty presentations of current problems in neurobiology. Prerequisite: consent of instructors. 3 units. *Cant, Lin, and Hall*

311. Concepts in Cell Biology. Evaluation of models currently used to describe cell biological processes with emphasis on analysis of experimental evidence in the scientific literature. Topics include: membrane structure, cell surface interactions in development, and muscle and cell motility. Prerequisite: consent of instructor. 3 units. *Schachat and Jakoi*

312. Research. Individual investigations in the various fields of anatomy. Laboratories in which a student may work include: three electron microscopy laboratories headed by Moses, Reedy, and Robertson with emphasis respectively on the fine structure and cell biology of chromosomes and associated structures, molecular structure and function of muscle, and biophysical studies of cell membranes and nervous tissue; physical anthropology laboratories and the primate facility under Simons, Cartmill, Hylander, MacPhee, Kay, and Smith concentrating on biomechanics, cytogenetics, comparative anatomy, and primate evolution and behavior; neuroanatomy laboratories under Hall, Cant, Lin, and Diamond emphasizing structural correlates of behavior and learning; neuroendocrinology laboratories under Everett and Tyrey with emphasis on brain mechanisms regulating reproductive functions of the pituitary gland; developmental and cellular biology laboratories under Counce with emphasis on developmental genetics of dipteran embryos, under Jakoi with emphasis on mechanisms for cell surface differentiation, under Marchase with emphasis on intercellular recognition and cell surface glycoprotein biogenesis, and under Schachat with emphasis on muscle biochemistry and development; and molecular structure laboratories under Longley, Erickson, Taylor, and Corless using a combination of electron microscopy, X-ray diffraction, and optical and computer methods of image analysis to study respectively fibrous proteins, microtubules, and photoreceptor membranes. Prerequisite: consent of instructor. Credit to be arranged; maximum 6 units. *Staff*

313, 314. Anatomy Seminar. Regular meeting of graduate students and staff in which current research problems in anatomy will be presented. 1 unit each. *Staff*

340. Tutorial in Advanced Anatomy. Topics for intensive reading and discussion will be chosen according to the student's interests, related to basic problems in biophysics, cytology, endocrinological control, growth and development, neuroana-

tomy, physical differentiation, and evolutionary origins of functional microsystems. Prerequisite: consent of instructor. Enrollment: maximum 8. Variable units. *Staff*

354. Research Techniques in Anatomy. A preceptorial course in various research methods in anatomy. An interested student might engage in research in one of the following: anthropology, electron microscopy, X-ray diffraction, chromosome analysis, developmental biology, primate behavior, primate anatomy, and stereotactic approaches to neuroendocrinology and neuroanatomy. Other topics may be arranged. Prerequisite: consent of instructor. Credit to be arranged. *Staff*

370. Neurobiology I. C-L: Pharmacology 370 and Physiology 370. 3 units. *Kirschner and staff*

418. Reproductive Biology. The lecture material in each section of the course is followed by seminar presentations which will contribute to Anatomy 424, a corequisite for the course. C-L: Physiology 418. 2 units. *Tyrey, Anderson, and Schomberg*

424. Seminar in Reproductive Biology. Can be taken independently or corequisite with Anatomy 418. C-L: Physiology 424. 1 unit. *Tyrey, Anderson, and Schomberg*

COURSES CURRENTLY UNSCHEDULED

219S. Seminar

238. Functional and Evolutionary Morphology of Primates

288S. The Cell in Development and Heredity

302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

Anthropology

Professor O'Barr, *Chairman* (114 Social Sciences); Associate Professor Quinn, *Director of Graduate Studies* (127 Social Sciences); Professors Cartmill, Fox, Friedl, and Simons; Associate Professors Apte, Glander, Hylander, and Smith; Assistant Professors Domínguez, Trouillot, Weller, Williams, and Zagarell; Professor Emeritus La Barre; Adjunct Associate Professors Kay and Stack

The department offers graduate work leading to the Ph.D. degree in anthropology. Applicants for admission should submit scores on the Graduate Record Examination Aptitude Test. Admission to the program is not contingent on previous anthropological course work or any other specific program of study at the undergraduate level.

The department offers a program of specialization in social/cultural anthropology and a program of specialization in physical anthropology. The emphasis of the social/cultural anthropology program is the application of a theoretical and comparative perspective to research in complex societies. Within this perspective, a wide range of interests is represented in the department. The emphasis of the physical anthropology program is primate evolution; areas of concentration include comparative morphology of human and nonhuman primates and primate social behavior.

Curriculum is tailored to the individual student's background, academic needs, and research goals; pursuit of relevant cross-disciplinary study, within and outside the department, is expected. However, a modest number of courses is required of students in both programs. Candidates for the Ph.D. degree must demonstrate competence in their chosen subfield of specialization and knowledge of the broad theoretical perspectives, from all relevant disciplines, which inform their area of concentration.

Further details of the graduate program in anthropology, the departmental facilities, the staff, and various stipends available are described in the *Guidelines for Grad-*

uate Students in Anthropology which may be obtained from the Director of Graduate Studies, Department of Anthropology.

For Seniors and Graduates

201S. Marxism and Anthropology. The interaction of Marxist and anthropological theory over the last half century; particular attention to evolution, historical transformation, mode of production, labor processes, culture, ideology, and consciousness. 3 units. *Smith*

204S. The Anthropology of Cities. Organization and behavior in urban centers from an evolutionary perspective; cross-cultural analysis of cities. Prerequisite: Anthropology 94. 3 units. *Fox or Smith*

205. The Anthropology of Anthropology. Effects of the organization and professional status of anthropological schools in the United States, Britain, and France up to World War II as they affected anthropological theory. Prerequisite: major in anthropology or graduate standing. 3 units. *Fox or Weller*

206S. Current Theoretical Schools in Anthropology. The theoretical schools since World War II, including cultural materialism and neo-Marxism, structuralism, cognitive anthropology, cultural analysis and symbolic anthropology, transactional analysis, and sociobiology. Prerequisite: Anthropology 94 or graduate standing or permission of instructor. 3 units. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, Trouillot, Weller, or Williams*

211S. Ethnography of Communication. History of the mutual influence of linguistics and anthropology leading to the development of ethnography of speaking, ethnohistory, structuralism, and sociolinguistics. Topics vary each semester. Prerequisite: Anthropology 111 or 119 or consent of instructor. 3 units. *Apte, Domínguez, O'Barr, Weller, or Williams*

215S. The Anthropology of Women: Theoretical Issues. Topic to be selected each semester from: gender ideology, women and work, gender inequality, the history of feminist anthropology, or others. 3 units. *Domínguez, Quinn, Smith or Trouillot*

228S. Slavery and Society. Western and non-Western systems of slavery and their effects on social organization, self-concepts, and race relations. 3 units. *Domínguez*

234S. Political Economy of Development: Theories of Change in the Third World. C-L: History 234S, Political Science 234S, and Sociology 234S. 3 units. *Bergquist, Fox, Gereffi, Smith, Trouillot, and Valenzuela*

237S. Interpretations of Kinship. The major interpretations of kinship in social organization. 3 units. *Domínguez, Quinn, or Williams*

239. Culture and Ideology. Major theories about the relationship between ideologies and social/economic systems. Readings from the works of Marx, Weber, Gramsci, Althusser, Geertz, and others. 3 units. *Trouillot, Weller or Williams*

241. The Rise of Civilization in Mesopotamia and Iran. An introductory survey of the major stages of development from the beginnings of agriculture to the collapse of the early state-system (10,000–1,800 B.C.E.). Archaeological and textual evidence, focusing on the rise of the Mesopotamian state-system, the nature of that system, and the mechanisms leading to its collapse. 3 units. *Zagarell*

243S. Theory and Method in Archaeology. Techniques of geochronology, environmental reconstruction, sociocultural reconstruction, and statistical analyses applied to problem areas in archaeology. Prerequisite: Anthropology 166 or consent of instructor. 3 units. *Zagarell*

244S. Primate Behavior. Social behavior of prosimians, monkeys, and apes and the evolutionary development of primates. 3 units. *Glander*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution or consent of instructor. C-L: Anatomy 246S. 3 units. *Simons*

258S. Symbols in Society. Symbolic action and expressive culture among tribal, peasant, and industrial societies. Approaches emphasized are functionalism, symbolic interaction, structuralism, and cultural interpretation. 3 units. *Apte, Trouillot, Weller, or Williams*

267. Cognitive Anthropology. The organization of culturally shared knowledge; cognitive tasks such as categorizing, decision making, problem solving, and reasoning. 3 units. *Quinn or Williams*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: consent of instructor. 6 units. *Staff*

282S. Canada. C-L: History 282S, Political Science 282S, and Sociology 282S. 3 units. *Leach*

For Graduates

330S, 331S. Theories in Sociocultural Anthropology. A two-semester seminar in anthropological theory, in which the modern currents and debates in the field are examined and discussed. Particular topics to be chosen by the instructors. 6 units. *Staff*

393. Individual Research in Anthropology. Supervision and guidance of A.M. thesis preparation, Ph.D. dissertation preparation, or other intensive research on a selected problem. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

275S. Inequality in Precapitalist Societies

334. Topics in Physical Anthropology

Art and Art History

Professor Spencer, *Director of Graduate Studies* (112A East Duke); Associate Professor Goffen; Assistant Professors Bruzelius and Higdon; Professor Emeritus Markman

Graduate work in the Department of Art and Art History is offered leading to the A.M. degree in art history and is designed to provide basic training in the history of art with specialization in a given field selected by the student after consultation with and approval of the Director of Graduate Studies. Prospective students should present a minimum of 24 semester hours of undergraduate work in the history of art. In special cases a student who does not fulfill this prerequisite may be required to attend prescribed undergraduate courses. A reading knowledge of one foreign language (preferably German) is required; candidates who do not meet this requirement upon admission to the program are expected to do so by the end of their first term in residence.

The program for the A.M. degree in art history consists of 30 units as follows: 12 units in art history; 6 units in an approved minor; 6 units in the major or minor, or other approved subject; and 6 units in thesis. A written thesis is required.

For Seniors and Graduates

230S. Medieval and Byzantine Art and Architecture. Conceptual, institutional, or stylistic topics. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. 3 units. *Bruzelius or Epstein*

232S. Romanesque and Gothic Art and Architecture. Analysis of an individual topic. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. 3 units. *Bruzelius*

234. Medieval Architecture. The development of medieval architecture through the mid-fourteenth century. Emphasis on churches, with some discussion of castles and fortifications, town planning, and domestic architecture. 3 units. *Bruzelius*

235. Gothic Cathedrals. Major monuments of Gothic architecture in the twelfth and thirteenth centuries on the continent and in England with concentration on the great cathedrals of France. 3 units. *Bruzelius*

241. Fifteenth-Century Italian Art. Painting, sculpture, and architecture from Masaccio, Donatello, and Brunelleschi to Leonardo. Emphasis on the art of Florence. 3 units. *Goffen or Spencer*

242S. Studies in Italian Renaissance Art. Specific problems dealing with iconography, style, or an individual master from ca. 1300 to 1600. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. 3 units. *Goffen and Spencer*

243S. Studies in Northern Art. Selected topics such as the Antwerp workshops of the sixteenth century, picturing in Haarlem at the turn of the seventeenth century, or Rubens and Rembrandt. 3 units. *Melion*

248. Art of Northern Europe in the Fifteenth and Sixteenth Centuries. The "Northern Renaissance," with emphasis on the Netherlandish schools. 3 units. *Melion*

249. Death in Art. The theme of death from classical antiquity to the seventeenth century, with emphasis on medieval and Renaissance art and on the changing conceptions of death and of the individual. 3 units. *Goffen*

251. Italian Baroque Art. Seventeenth-century painting, sculpture, and architecture. 3 units. *Melion*

252. Northern Baroque Painting. Seventeenth-century Flemish and Dutch painting, with emphasis on the art of Rubens and Rembrandt. 3 units. *Melion*

262S. Problems in Nineteenth-Century Art. 3 units. *Shapiro*

274. The History of Impressionism. The evolution of the impressionist movement and the works of its major masters. Particular attention will be paid to Monet, Degas, Cézanne, Pissarro, and Renoir. 3 units. *Staff*

275. Surrealism. The surrealist movement that flourished in Paris between the World Wars; its origins, aims, and major adherents—such as the artists Miró, Magritte, Tanguy, and Dali—examined in the context of surrealist literature, theory, and politics. 3 units. *Higdon*

276S. Problems in Modern Art. Selected topics in modern art before 1945, with emphasis on major movements or masters. Prerequisite: consent of instructor. 3 units. *Higdon or Shapiro*

278. Twentieth-Century Criticism. Twentieth-century art through the writings of its major proponents from Apollinaire and Roger Fry through Meyer, Schapiro, and Clement Greenberg to present-day theorists of postmodernism. The definition of

modernism and the role of the critic as advocate, mediator, arbiter, and prophet of contemporary trends. 3 units. *Higdon*

293S. Methods in Art History. Approaches to the study of works of art, including connoisseurship, iconology, and stylistic analysis. Open to art majors, seniors, and qualified juniors only. 3 units. *Staff*

294, 295. Special Problems in Art History. Individual study and research. 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

220S. Greek Painting

227. Early Christian Culture: Evidence of Art and Literature

231. Byzantine Art and Architecture

240. Italian Art

245. Sixteenth-Century Italian Art

277S. Contemporary Art

279S. Problems in Modern Architecture

Asian Languages

The courses are offered as an enrichment for students interested in the South Asian subcontinent and may be taken as a general elective by advanced undergraduate students. No major work is offered in Hindi-Urdu.

COURSES CURRENTLY UNSCHEDULED

Hindi-Urdu 200, 201. Special Studies in South Asian Languages

Hindi-Urdu 203. Studies in Commonwealth Literature

For courses in Chinese and Japanese, see *Bulletin of Duke University: Undergraduate Instruction*.

Biochemistry

Professor Hill, *Chairman* (255 Nanaline H. Duke); Professor Siegel, *Director of Graduate Studies* (252 Nanaline H. Duke); Professors Bell, Fridovich, Gross, Guild, Kamin, Kirshner, McCarty, Modrich, Rajagopalan, Spicer and Webster; Associate Professors Greene, Greenleaf, B. Kaufman, Lynn, D. Richardson, Sage, Steege, and Sullivan; Assistant Professors Hershfield, Holmes, Hsieh, R. Kaufman, Kredich, Lefkowitz, McKee, Pizzo, Roses, and Wheat; Professor Emeritus Bernheim; Associate Medical Research Professor J. Richardson; Assistant Medical Research Professors C. Bonaventura and J. Bonaventura

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate majors in chemistry, biology, mathematics, or physics are welcome, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and function, crystallography of macromolecules, nucleic acid structure and function, lipid biochemistry, membrane structure and function, molecular genetics, enzyme mechanisms, and neurochemistry. The Division of Genetics of the department, in cooperation with the University Program in Genetics, offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree.

200. General Biochemistry. An introductory survey of fundamental aspects of biochemistry with emphasis on the structure of macromolecules, mechanism of enzyme action, metabolic pathways, biochemical genetics, and the structure and functions of special tissues. Designed for medical students; graduate students only with consent of instructor. 4 units. *Hill and staff*

209, 210. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. Credit to be arranged. *Staff*

215. Genetic Mechanisms. Genetic mechanisms in molecular terms emphasizing gene function, segregation, and regulation in procaryotes and eucaryotes. Systems covered include bacterial viruses, bacteria, plasmids, cellular organelles, and selected lower and higher eucaryotes. Prerequisite: introductory biochemistry. Course material will be drawn from original literature. C-L: Genetics—The University Program. 3 units. *Gross and staff*

219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. 3 units. *McCarty and staff*

219S. Seminar. Optional seminar in conjunction with Biochemistry 219. *McCarty*

220L. Adaptations of Organisms to the Marine Environment. Introduction to basic concepts of biochemistry and to variables in the marine environment which evoke adaptive responses. Specific adaptations at the molecular level. Biological fitness from a biochemical viewpoint. Prerequisites: introductory biology and organic chemistry and consent of instructor. C-L: Marine Sciences 220L. Offered at Beaufort. 4 units. *C. Bonaventura and J. Bonaventura*

220S. Adaptations of Organisms to the Marine Environment. 2 units. *C. Bonaventura or J. Bonaventura*

222. Structure of Biological Macromolecules. Introduction to the techniques of structure determination by X-ray crystallography and study of some biological macromolecules whose three-dimensional structures have been determined at high resolution. 2 units. *Richardson*

224. Biochemistry of Development and Differentiation. The course represents an extension of topics covered in the first semester course, Biochemistry 219. Emphasis will be on the control of transcription and translation of messenger RNA in mammalian cells. These studies include gene amplification, postsynthetic modifications of chromosomal proteins, as a result of hormone induction. Specific systems will include the development of the mammary gland, the pancreas, and the chick oviduct. 2 units. *McCarty*

227. Introductory Biochemistry I: Intermediary Metabolism. Prerequisite: organic chemistry. C-L: Botany 227. 3 units. *Staff*

228. Introductory Biochemistry II: Biological Macromolecules. Prerequisite: Biochemistry 227 or equivalent. C-L: Botany 228. 3 units. *Greenleaf and Webster*

245L. Macromolecules, Ecology, and Evolution. The structure and function of protein and nucleic acid molecules with particular emphasis on the application of molecular techniques to questions in ecological, systematic, and evolutionary theory. C-L: Marine Sciences 245L. 3 units. *Sullivan*

259. Molecular Biology I: Protein and Membrane Structure/Function. C-L: Anatomy 259, Microbiology and Immunology 259, and the University Program in Cell and Molecular Biology. 3 units. *Staff*

265S, 266S. Seminar. Topics and instructors announced each semester. C-L: Marine Sciences. 2 units or variable. *Staff*

268. Molecular Biology II: Nucleic Acids. C-L: Botany 268, Microbiology and Immunology 268, and the University Program in Cell and Molecular Biology. 3 units. *Modrich and staff*

276. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of instructor. Offered at Beaufort. C-L: Marine Sciences 276. 6 units. *Sullivan*

286. Current Topics in Immunochemistry. The structure, function, and specificity of antibodies. Immunogenicity and tolerance with special emphasis on current theories of the diversity and synthesis of antibody molecules. 2 units. *Sage*

288. The Carbohydrates and Lipids of Biological Systems. The subjects will be considered in the following two general categories: (a) the relationship between chemical structure and biological function, and (b) biosynthesis and catabolism. 2 units. *Kaufman*

291. Physical Biochemistry. Principles of thermodynamics, hydrodynamics, spectroscopy, and X-ray diffraction and scattering are applied to biological systems. Biological molecules and macromolecules in both soluble and crystalline states are discussed. Prerequisite: undergraduate physical chemistry, including solution thermodynamics, kinetics, introductory quantum mechanics, and introductory crystallography. 3 units. *Hsieh and staff*

296. Biological Oxidations. A lecture, conference, and seminar course on the mechanism of electron transport and energy conservation in purified enzymes and in organized systems such as the mitochondrion, the endoplasmic reticulum, and the chloroplast. 2 units. *Kamin and staff*

297. Intermediary Metabolism. Lectures and student presentations on selected topics in the areas of metabolic regulation, bioenergetics, and other subjects of current research interest in metabolism. 3 units. *Siegel and staff*

299. Nutrition. This course examines the experimental basis for the identification and quantification of requirements for calories, macronutrients, and micronutrients (vitamins and minerals); the biochemistry of nutrition with the assessment of nutriture; and the biological effects of deficiency or excess of nutrients. The course seeks to define optimal nutriture and will search for factual bases for common beliefs on nutrition of individuals and populations. Informal lectures and, if possible, student seminars. Prerequisite: a basic biochemistry course or equivalent or consent of instructor. 2 units. *Kamin*

345, 346. Biochemistry Seminar. Required of all biochemistry students. 1 unit each. *Guild and Richardson*

347, 348. Seminar in Toxicology. A weekly research seminar throughout the year is required of participants in the toxicology program. Students, faculty, and invited speakers present their findings. C-L: Pharmacology 347, 348. 1 unit per semester. *Lynn and Abou-Donia*

Botany

Professor W. Culberson, *Chairman* (149 Biological Sciences); Professor Searles, *Director of Graduate Studies* (257 Biological Sciences); Professors Antonovics, Barber, Boynton, Johnson, Stone, Strain, White, and Wilbur; Associate Professors Christensen, Knoerr, Ramus, Schlesinger, and Siedow; Assistant Professors Johnston and Mishler; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Adjunct Professor C. Culberson; Adjunct Assistant Professor Patterson

Graduate work in the Department of Botany is offered leading to the A.M. (non-thesis), M.S. (thesis), and Ph.D. degrees. Before undertaking graduate study in botany a student should have had in the undergraduate program at least 12 semester hours of botany beyond an elementary course, and related work in biological sciences. Some work in chemistry and physics will be desirable and, for some phases of botanical study, a necessity. The student's graduate program is planned to provide a broad basic training in the various fields of botany, plus intensive specialization in the field of the research problem.

205. Molecular Biology and Genetics. Molecular aspects of gene expression and cell differentiation; application of recombinant DNA techniques to basic and applied problems. Prerequisites: organic chemistry and cell biology or genetics. 3 units. *Johnston*

209L. Lichenology. Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. 3 units. *W. Culberson and C. Culberson*

210L. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. 3 units. *Mishler*

212L. Phycology. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. 4 units. *Searles*

215L. Primary Productivity in the Seas. The biological flux of carbon in the coastal and open seas involving phytoplankton, seaweeds, seagrasses, and marshgrasses. The contributions of these primary producers to food chain processes and global atmospheric-sedimentary cycles, as well as the ecological consequences of variations in photosynthetic mechanisms. Prerequisites: introductory biology and introductory chemistry. Offered at Beaufort. C-L: Marine Sciences 215L and Zoology 215L. 4 units. *Barber and Ramus*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: a course in general ecology. Offered at Beaufort. C-L: Marine Sciences 218 and Forestry and Environmental Studies 218. 6 units. *Staff*

219L. Benthic Marine Algae. Morphology, reproduction, life histories, systematics, and natural history of seaweeds. Lectures, laboratories, and field work in ocean and estuaries. Prerequisite: introductory biology; plant diversity recommended. Offered at Beaufort. C-L: Marine Sciences 219L. 4 units. *Searles*

221L. Mycology. Field and laboratory study of vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in local flora. Prerequisite: one year of biological science. 4 units. *Johnson*

225T, 226T. Special Problems. Students with adequate training may do special work in the fields listed below. Credit to be arranged. 1 to 4 units.

2. Genetics. *Antonovics*
3. Biological Oceanography. *Barber*
4. Genetics. *Boynton*
5. Ecology. *Christensen*
6. Lichenology. *W. Culberson*
7. Bacteriology; Mycology. *Johnson*
8. Molecular Botany. *Johnston*
9. Systematics and Bryology. *Mishler*
10. Phycology. *Ramus*
11. Ecology. *Schlesinger*
12. Phycology. *Searles*
13. Physiology. *Siedow*
14. Systematics of Flowering Plants. *Stone*
15. Ecology. *Strain*
16. Anatomy and Morphology of Vascular Plants. *White*
17. Systematics and Taxonomy of Vascular Plants. *Wilbur*

227. Introductory Biochemistry I: Intermediary Metabolism. Chemistry of the constituents of proteins, lipids, carbohydrates, and nucleic acids and their metabolic interrelationships. Prerequisite: organic chemistry. C-L: Biochemistry 227. 3 units. *Staff*

228. Introductory Biochemistry II: Biological Macromolecules. Prerequisite: Botany 227 or equivalent. C-L: Biochemistry 228. 3 units. *Greenleaf and Webster*

232. Microclimatology. C-L: Forestry and Environmental Studies 232. 3 units. *Knoerr*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Zoology 237L. 3 units. *Lundberg and Stone*

242L. Systematics. Principles of vascular plant taxonomy, with practice in identification of the local flora. Lectures, laboratories, and field trips. Prerequisite: one year of biology. 4 units. *Wilbur*

245L. Plant Diversity. Major groups of the living plants; their evolutionary origins and phylogenetic relationships. Prerequisite: introductory biology. 4 units. *W. Culberson and White or Searles and Wilbur*

246L. Ecology of Plants. Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: introductory biology and one other course in biology. 4 units. *Christensen, Schlesinger, or Strain*

250L,S. Plant Biosystematics. Descriptive and experimental procedures used to assess systematic implications of vascular plant evolution. Laboratory, discussion, and field-oriented problems. Prerequisites: basic courses in systematics and genetics. 4 units. *Stone*

251L. Plant Physiology. The principal physiological processes of plants including respiration, photosynthesis, water relations, and factors associated with plant morphogenesis. Prerequisites: introductory college biology and one year of chemistry; organic chemistry is desirable. 4 units. *Siedow*

253. Biophysical Plant Physiology. Application of physical principles to such processes as ion transport, water relations, and the interconversion of energy in plant cells. Prerequisites: Botany 151L and Mathematics 32 or equivalent. 3 units. *Siedow*

258. Physiology of Growth and Development. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation

at the cellular, tissue, and organ level in plants. Lectures. Prerequisite: Botany 151L or equivalent; organic chemistry is recommended. 3 units. *Naylor*

260L. Plant Anatomy. A comparative study of basic cell types, tissues, and organs of vascular plants. Correlation of anatomical information with pertinent literature, application of anatomy to problems in systematics and evolution, and the interrelationship between structure and function. Prerequisite: one year of biology or consent of instructor. 4 units. *Philpott and White*

261. Photosynthesis. Principles of plant photosynthesis: developmental, mechanistic, regulatory, and ecological aspects of the photosynthetic process. Prerequisite: Botany 151L or 251L. 3 units. *Naylor or Siedow*

263L. Tropical Seaweeds. Collection, preservation, description, identification, illustration, and descriptive ecology. Two-week field study on Andros Island in the Bahamas. Prerequisite: Botany 145L or equivalent or consent of instructor. C-L: Marine Sciences 263L. 2 units. *Searles*

265L. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Botany 146L and 151L or equivalents. 3 units. *Strain*

267L. Plant Community Ecology. Concepts and methods of plant synecology. Introduction to the plant communities of North Carolina. Prerequisites: Botany 142L and 146L or equivalents and consent of instructor. 3 units. *Christensen*

268. Molecular Biology II: Nucleic Acids. C-L: Biochemistry 268, Genetics—The University Program, Microbiology and Immunology 268, and the University Program in Cell and Molecular Biology. 3 units. *Modrich and staff*

269. Advanced Cell Biology. C-L: Anatomy 269, Microbiology and Immunology 269, the University Program in Cell and Molecular Biology, and Zoology 269. 3 units. *Endow and staff*

272. Ecosystem Analysis. Current problems and progress in studies of terrestrial ecosystems and the biosphere, including energy flow and mineral cycling processes. Prerequisite: Botany 146L. 3 units. *Schlesinger*

280. Principles of Genetics. C-L: Genetics—The University Program, and Zoology 280. 3 units. *Antonovics, Boynton, and Gillham (zoology)*

285S. Ecological Genetics. Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Botany 180 and 286 or equivalents. C-L: Genetics—The University Program. 3 units. *Antonovics*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisite: Zoology 74 or a course in genetics. C-L: Genetics—The University Program, and Zoology 286. 3 units. *Antonovics and H. Wilbur (zoology)*

287. Macroevolution. Evolutionary patterns and processes at and above the species level. Topics include: species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Zoology 287. 3 units. *Mishler and Roth*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and

weekend field trips. Prerequisites: calculus, ecology, and consent of instructor. C-L: Zoology 293L. 3 units. *Antonovics and H. Wilbur (zoology)*

295S, 296S. Seminar. Credit to be arranged. *Staff*

300. Tropical Biology: An Ecological Approach. Highly intensive, field-oriented course conducted in Costa Rica under auspices of the Organization for Tropical Studies. For additional information refer to the chapter "Special and Cooperative Programs." 6 to 8 units. *Staff*

330L. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air resources. Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Prerequisite: consent of instructor. C-L: Forestry and Environmental Studies 330L. 4 units. *Knoerr*

359, 360. Research in Botany. Individual investigation in the various fields of botany. C-L: Marine Sciences 359, 360. Credit to be arranged. *All members of the graduate staff*

COURSES CURRENTLY UNSCHEDULED

243S. Classification of Angiosperms

247L. Plant Ecology

283. Extrachromosomal Inheritance

344. Micrometeorology and Biometeorology Seminar

RELATED PROGRAMS

The University Program in Genetics. Genetics courses offered by the botany department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under Genetics—The University Program for descriptions of the following courses: 215. Molecular Genetics; 285S. Ecological Genetics; 286. Evolutionary Mechanisms; 336. Immunogenetics; 350. Genetics Colloquium.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to the section on Organization for Tropical Studies in the chapter "Special and Cooperative Programs."

The University Program in Marine Sciences. Interdisciplinary programs emphasizing marine botany are available. Refer to the section on Marine Sciences—The University Program.

Business Administration

Professor Keller, *Dean* (219W Fuqua School of Business); Professor Bettman, *Director of Graduate Studies* (429E Fuqua School of Business); Professors Baligh, Cohen, Forsyth, Laughhunn, Lewin, Morey, Naylor, Payne, Peterson, Staelin, Viscusi, and Winkler; Associate Professors Battle, Burton, Capettini, Dellinger, Dittman, Hekman, Huber, Hughes, McCann, Magat, Mazzola, Schmenner, and Vaupel; Assistant Professors Burke, Cox, Edell, Gardner, Hoskin, Karwan, Piros, Reuben, Ricks, Schuette, Sheppard, and Tsui

The Ph.D. in Business Administration program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities

are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results.

The program requires that doctoral candidates must acquire expertise in three disciplines: economics, behavioral science, and quantitative methods. In addition, each candidate must acquire knowledge at the M.B.A. level of at least three of the following functional areas: accounting, finance, marketing, and operations management. Competence in the three disciplines and the functional areas may be gained from the student's choice of course work, participation in seminars, and independent study. Each student takes a comprehensive examination at the end of the second year or at the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires three to four years of work beyond the bachelor degree. Students entering the program with an M.B.A. or other advanced work may be able to reduce the time in residence by a year.

Refer to the *Bulletin of Duke University: The Fuqua School of Business* for a complete list of courses and course descriptions.

510. Bayesian Inference and Decision. Methods of Bayesian inference and statistical decision theory, with emphasis on the general approach of modeling inferential and decision-making problems as well as the development of specific procedures for certain classes of problems. Topics include subjective probability, Bayesian inference and prediction, natural-conjugate families of distributions, Bayesian analysis for various processes, Bayesian estimation and hypothesis testing, comparisons with classical methods, decision-making criteria, utility theory, value of information, and sequential decision-making. 3 units. *Winkler.*

521. Organization Seminar: A Micro Focus. Individual and small group behavior in organizations. Theories of motivation, decision making, interpersonal behavior, group processes, and leadership. A variety of research approaches and methods includes presentation of behavioral research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

522. Organization Seminar: A Macro Focus. The organization and the subunits which make up the organization. Theories of organization, structure, decentralization, divisionalization, functional area integration, task design, incentives and rewards, information systems, and decision rules are developed with an orientation toward their choice and design for high performance. Includes presentation of research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

531. Financial Accounting Seminar. The nature of published financial statement information and its relationship with various economic variables. The list of related variables might include stock market data, bankruptcy filings, and the actions of various users of financial statement information, including management, investors, creditors, and regulators. The focus is on the current research methodologies and research efforts used to analyze the above relationships. A background in masters level accounting and finance is assumed. 3 units. *Staff*

532. Management Accounting Seminar. Information systems and their use in facilitating management decision making and organizational control. Emphasis on the appropriate research methodologies and paradigms including information economics, decision theory, and organizational theory. Topics include budgeting, incentive systems/performance evaluation, variance investigation, and cost allocation. 3 units. *Staff*

551. Corporate Finance Seminar. Introduction to research areas in corporate finance. Emphasis on the research interests of the instructor, and one of the following

topics to be explored in depth: capital budgeting, capital structure, mergers and acquisitions, international finance, and cash management. 3 units. *Staff*

552. Investment Seminar. Survey of research in the investment area and exploration in depth of one or more problems in which research is currently active. Emphasis determined by the instructor from one or more of the following areas: valuation of risky securities, capital asset pricing model and extensions, capital market efficiency, portfolio theory, options and warrants, investment management, and futures contracts. 3 units. *Staff*

561. Seminar in Quantitative Research in Marketing. An overview of the quantitative techniques which are important in marketing research. Each model and technique will be examined in considerable detail so as to permit an understanding of its assumptions, structure, and usefulness. Topics covered will include the general data analysis techniques as well as models from advertising, new products, and pricing decisions. 3 units. *Staff*

562. Seminar in Behavioral Models in Marketing. Examines the development of research in consumer behavior. Major emphasis is given to theoretical developments and empirical research. Students are expected to formulate and test a framework or model of consumer behavior with respect to a marketing problem or topic. 3 units. *Staff*

571. Operations Strategy Seminar. Recent developments in the strategy of operations in both the manufacturing and service sectors. Topics include the focused factory concept, Japanese manufacturing philosophy, technological policy toward new process development and toward new product introduction, vertical integration, choice of capacity and location, industry analysis, and the impact of government regulation. Emphasis on the development of hypotheses about strategic topics and the empirical means by which they can be tested. 3 units. *Staff*

572. Seminar in Operational and Technological Tactics. Current issues in the day-to-day management of manufacturing and service delivery systems. Topics include material requirements planning, capacity requirements planning, quality of work life projects, productivity measurement and enhancement, implementation of new product introductions and production process modifications, quality assurance, production planning and scheduling, and logistics. Concentration on the substance of recent developments, the generation and test of hypotheses about tactical issues, and the applicability of various optimization techniques to the advance of operation tactics. 3 units. *Staff*

597. Dissertation Research. For students actively pursuing research on their dissertation. Prerequisites: student must have passed the preliminary examination and have the consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

598. Independent Study. Allows the doctoral student the opportunity to engage in study or tutorial on special topics on an individual basis under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

599. Directed Research. Allows the doctoral student to engage in individual research projects under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

COURSES CURRENTLY UNSCHEDULED

- 309.1-.9. Research in Managerial Economics
- 319.1-.9. Research in Quantitative Methods
- 329.1-.9. Research in Organization Theory and Management
- 339.1-.9. Research in Information and Accounting Systems
- 349.1-.9. Research in Public Policy and Social Responsibility
- 359.1-.9. Research in Finance
- 369.1-.9. Research in Marketing
- 379.1-.9. Research in Production
- 392-393. Tutorial in Interdisciplinary Areas
- 397. Dissertation Research

The University Program in Cell and Molecular Biology

Program Administration: Professor Hill, *Director* (biochemistry); Associate Professor Kaufman, *Associate Director* (biochemistry); Professors Lauf (physiology), Modrich (biochemistry), Nicklas (zoology), Pizzo (pathology), and Vanaman (microbiology and immunology); Associate Professor Siedow (botany); Assistant Professor Marchase (anatomy)

Faculty: A complete list of faculty, including research interests, will be made available to prospective students.

Research training in cell, developmental, and molecular biology is found in eight departments at Duke University: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. To effectively utilize this broad spectrum of expertise for the training of promising, young scientists while still providing a coherent curriculum, the Duke University Program in Cell and Molecular Biology has been established.

During the first year of doctoral study a student will complete the program's three-course sequence presenting current understanding and research activities in cell biology and the molecular biology of nucleic acids, proteins, and membranes. Each student will also affiliate with a department, fulfill departmental requirements, and choose elective courses in an area of specialization. Research training is stressed throughout the program and dissertation research usually begins by the third semester. Normally the dissertation adviser will be chosen from within the student's own department but, depending on the student's research interests, dissertation research with an adviser in another department may be approved.

Prospective students may apply directly to the Cell and Molecular Biology Program or to one of the eight participating departments. Those who apply to the program must also designate a departmental preference. Applicants must have demonstrated, in addition to overall academic excellence, a proficiency in the biological and physical sciences. Applications for admission and fellowship support must be received by February 1, but early applications may receive earlier consideration.

259. Molecular Biology I: Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Prerequisite: introductory biochemistry or consent of

instructor. C-L: Anatomy 259, Biochemistry 259, and Microbiology and Immunology 259. 3 units. *Richardson and staff*

264. Cell and Molecular Biology Seminar. Required of all students. Third- and fourth-year students discuss their dissertation research. 1 unit. *Staff*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry, Molecular Biology I, or consent of instructor. C-L: Biochemistry 268, Botany 268, and Microbiology and Immunology 268. 3 units. *Modrich and staff*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of designated instructor. C-L: Anatomy 269, Botany 269, Microbiology and Immunology 269, and Zoology 269. 3 units. *McClay and staff*

Chemistry

Professor Lochmüller, *Chairman* (101 Gross Chemical Laboratory); Associate Professor Baldwin, *Director of Graduate Studies* (329 Gross Chemical Laboratory); Professors Arnett, Chesnut, Fraser-Reid, Jeffs, Krigbaum, McPhail, Palmer, Poirier, Porter, Quin, Smith, Strobel, Wells, and Wilder; Associate Professors Crumbliss, Henkens, and Shaw; Assistant Professors Anderson, MacPhail, and Sternbach; Adjunct Professors Ghirardelli, Pitt, and Spielvogel; Adjunct Assistant Professor Switzer

In the Department of Chemistry graduate work is offered leading to the M.S. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

For Seniors and Graduates

201. Molecular Spectroscopy. Selected spectroscopic methods in the study of molecular structure. Symmetry and group theoretical basis for selection rules, theories of magnetic and optical resonance, and interpretation of spectra; examples from both inorganic and organic chemistry. Three lectures. Prerequisite: consent of department. 1 to 3 units. *Staff*

203. Quantum Chemistry. Basic principles of quantum and group theoretical methods. Topics include symmetry, a review of the fundamentals, and the mathematical foundations of quantum theory. Emphasis on the application of molecular orbital theory to organic and inorganic systems. Prerequisite: Chemistry 162. 1 to 3 units. *Chesnut*

205. Structure and Reaction Dynamics. Structure and mechanisms in organic and inorganic compounds, substitution reactions, linear free energy relations, and molecular rearrangements. Emphasis on the use of kinetic techniques to solve problems in reaction mechanisms. Three lectures. Prerequisite: consent of department. 1 to 3 units. *Staff*

207. Principles of Kinetics, Thermodynamics, and Diffraction. Three lectures. Prerequisite: consent of instructor. 1 to 3 units. *Staff*

275, 276. Advanced Studies. (1) Analytical chemistry, (2) inorganic chemistry, (3) organic chemistry, and (4) physical chemistry. Open to especially well-prepared undergraduates by consent of department. 6 units. *Staff*

For Graduates

300. Basic Statistical Mechanics. Fundamentals of quantum and classical statistical mechanics using the ensemble approach. Emphasis on systems of weakly interacting particles with internal degrees of freedom. 3 units. *Staff*

302. Basic Quantum Mechanics. The fundamentals of quantum mechanics with special emphasis on chemical applications. Topics included are: linear algebra, the uncertainty relations, angular momentum, perturbation theory and time dependent phenomena, molecules in electromagnetic fields, group methods, and electron correlation. 3 units. *Staff*

303, 304. Special Topics in Physical Chemistry. Presentation of one or more topics of staff interest such as advanced methods in crystallography, light scattering and small angle X-ray diffraction, application of ESR spectroscopy to chemical problems, electronic spectroscopy of proteins, group theory, intermolecular forces, liquid crystals, methods of determining the rates of elementary steps in reaction kinetics, physical chemistry of aerosols, physical-chemical methods of polymer characterization, structure and bonding in metallo-enzymes, statistical mechanics of fluids, topics in structural chemistry, and triplet excitons. 1 to 3 units each. *Staff*

310. Theoretical and Structural Inorganic Chemistry. An advanced study of theoretical concepts and structural determination techniques as applied to inorganic systems. Areas included are crystal field and ligand field theories; magnetic susceptibility; and electronic, infrared, and Raman spectroscopy. 3 units. *Crumbliss and Palmer*

312. Inorganic Reactions and Mechanisms. Chemistry of main group and transition elements. Emphasis on current developments in synthetic and mechanistic studies of inorganic, organometallic, and organometalloid compounds. 3 units. *Crumbliss and Wells*

313. Special Topics in Inorganic Chemistry. Lectures, oral reports, and discussions on advanced topics and recent advances in the field of inorganic chemistry. Examples of topics which may be discussed are bioinorganic chemistry, fluxional molecules, homogeneous catalysis, synthesis and properties of selected groups of compounds, and new physical methods. 1 to 3 units. *Staff*

320. Synthetic Organic Chemistry. A study of the scope and limitations of the more important types of reactions in synthetic organic chemistry. Some discussion of the rapidly developing use of transition metals, complex hydrides, and photochemistry will be included. 3 units. *Baldwin or Sternbach*

322. Organic Reactive Intermediates. A discussion of reactive intermediates in organic chemistry. Topics will include carbanions, carbenes, carbonium ions, free radicals, photochemical excited states, and other reactive species. 3 units. *Porter, Wilder, and Arnett*

324. Special Topics in Organic Chemistry. Advanced topics and recent developments in the field of organic chemistry. Each year heterocyclic chemistry or the chemistry of natural products will be among the topics presented. Lectures and written and oral reports. 1 to 3 units. *Staff*

330. Separation Science and Fundamental Electrochemistry. Section .01, fundamental separation chemistry; section .02, practical aspects of chromatographic separation methods; section .03, fundamentals of electrochemistry. 1 to 3 units. *Staff*

331, 332. Special Topics in Analytical Chemistry. An advanced treatment of important areas in modern analysis. Possible topics include: electrochemistry, small computer applications, magnetic resonance, and problem-solving approaches. 1 to 3 units each. *Staff*

334. Chemical Instrumentation and Practical Electrochemistry. Section .01, basic chemical instrumentation; section .02, optical chemical instrumentation; section .03, practical electrochemistry. 1 to 3 units. *Staff*

373, 374. Seminar. One unit is required of all Ph.D. candidates in chemistry. One hour a week discussion. 1 unit each. *All members of the graduate staff*

375, 376. Research. The aim of this course is to give instruction in methods used in the investigation of original problems. Individual work and conferences. 1 to 6 units each. *All members of the graduate staff*

377. Research Orientation Seminar. A survey of departmental research. Required of all entering graduate students in chemistry. Prerequisite: consent of Director of Graduate Studies. 1 unit. *All members of the graduate staff*

Classical Studies

Professor Richardson, *Chairman* (312 Carr); Associate Professor Younger, *Director of Graduate Studies* (316 Carr); Professors Newton, Oates, and Willis; Associate Professors Burian, Rigsby, and Stanley; Assistant Professor Boatwright; Visiting Professor Michels

The Department of Classical Studies offers graduate work leading to the A.M. and Ph.D. degrees. For regular admission, students should offer three years of college study in one of the classical languages and two college years in the other. Upon matriculation all students take a diagnostic examination in Greek and Latin to determine the appropriate language and literature courses for further study.

A reading knowledge of French and German is required of all candidates for the Ph.D. The candidate should meet one of the language requirements by the end of the first term in residence and the other by the end of the third term.

The department expects the typical student, before beginning the dissertation, to have taken the equivalent of at least six Greek and/or Latin courses, five history courses, and two art and archaeology courses. The department maintains one of the country's major collections of Greek and Latin manuscripts and papyri, and an excellent study collection of Greek and Roman art. The Director of Graduate Studies will provide on request a brochure detailing further information about the department's special requirements in course work, preliminary examinations, and thesis and dissertation writing; prospective students should also consult the general requirements of the University set forth in the section about program information in this bulletin.

GREEK

For Seniors and Graduates

200. Graduate Reading. 3 units. *Staff*

203. Homer. Problems of language and structure in the *Iliad*; present state of Homeric scholarship. 3 units. *Stanley*

205. Greek Lyric Poets. Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. 3 units. *Burian*

206. Aeschylus. The *Oresteia*, with study of the form of *Agamemnon* and its place in the design of the trilogy. 3 units. *Willis*

210. Aristophanes. Origin and development of Greek comedy; representative plays. 3 units. *Burian*

221. Early Greek Prose. Greek prose in the fifth century from the Ionian scientists and logographers to Herodotus, Gorgias, Antiphon, and the Old Oligarch. 3 units. *Willis*

226. Orators. Selections from the principal Attic orators, with emphasis on Lysias and Demosthenes. 3 units. *Willis*

For Graduates

301. Seminar in Greek Literature I. Selected authors and topics. 3 units. *Burian, Stanley, or Willis*

302. Seminar in Greek Literature II. Selected authors and topics. 3 units. *Burian, Stanley, or Willis*

321. Seminar in Literary Papyri. 3 units. *Willis*

399. Directed Reading and Research. Credit to be arranged. *Burian, Stanley, or Willis*

Courses Currently Unscheduled

209. Euripides

222. Thucydides

313. Proseminar in Greek Epigraphy

LATIN

For Seniors and Graduates

200. Graduate Reading. 3 units. *Stanley or Younger*

201. The Verse Treatise. The genre of didactic poetry, with emphasis upon Lucretius's *De Rerum Natura* and Vergil's *Georgics*. 3 units. *Newton*

202. Early Latin. Representative authors and inscriptions from the early years of the Roman Republic. 3 units. *Richardson*

203. Epic: Vergil. The *Aeneid*. 3 units. *Newton*

210. Lyric and Occasional Poetry. Emphasis upon Catullus and Horace; additional readings and reports on the *Appendix Vergiliana*, Statius, and Martial. 3 units. *Staff*

211. Elegiac Poets. The traditions of Roman love elegy and its development in Propertius, Tibullus, and Ovid. 3 units. *Richardson or Michels*

215. The Historians. Representative historians, including one or more of the following: Livy, Caesar, Sallust, Tacitus. 3 units. *Richardson or Boatwright*

221. Medieval Latin. Selected works of the Latin Middle Ages from Prudentius to the humanists; genres studied usually include the hymn, sequence, drama, lyric, saints' lives, chronicle, epic, and epistle. C-L: Medieval and Renaissance Studies. 3 units. *Newton*

For Graduates

301. Seminar in Latin Literature I. Selected authors and topics. 3 units. *Boatwright, Newton, or Richardson*

302. Seminar in Latin Literature II. Selected authors and topics. 3 units. *Boatwright, Newton, or Richardson*

312. Proseminar in Latin Paleography. C-L: Medieval and Renaissance Studies. 3 units. *Newton*

314. Proseminar in Latin Epigraphy. 3 units. *Rigsby*

399. Directed Reading and Research. Credit to be arranged. *Boatwright, Newton, or Richardson*

Courses Currently Unscheduled

204. Epic

315. Proseminar in Roman Law

CLASSICAL STUDIES

For Graduates

301. Proseminar in Classical Studies. Introduction to the bibliography and principal disciplines of the field. 3 units. *Staff*

CLASSICAL STUDIES (ANCIENT HISTORY)

For Seniors and Graduates

256. The Fourth Century through Alexander. 3 units. *Rigsby*

258. Social and Cultural History of the Graeco-Roman World. 3 units. *Staff*

261. The Roman Revolution, 146-30 B.C. 3 units. *Oates*

For Graduates

At least two of these are offered each year.

321. Seminar in Ancient History I. Selected topics. 3 units. *Oates or Rigsby*

322. Seminar in Ancient History II. Selected topics. 3 units. *Oates or Rigsby*

399. Directed Reading and Research. Credit to be arranged. *Staff*

Courses Currently Unscheduled

327. Seminar in Byzantine History

CLASSICAL STUDIES (ARCHAEOLOGY)

For Seniors and Graduates

233. Greek Architecture. Development of form and function in the various religious, civic, and domestic building types, from the Bronze Age through the Hellenistic period. 3 units. *Richardson or Younger*

234. Roman Sculpture. The evolution of religious, commemorative, and decorative relief, and portrait and monumental sculpture. From Italic origins to the later Empire. 3 units. *Younger*

235. Roman Architecture. Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early Empire. 3 units. *Richardson*

236S. Roman Painting. Roman pictorial art with concentration on the wall paintings from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. 3 units. *Richardson*

For Graduates

311. Archaeology Seminar I. 3 units. *Staff*

312. Archaeology Seminar II. 3 units. *Staff*

Courses Currently Unscheduled

231S. Greek Sculpture

232S. Greek Painting

Under the terms of a cooperative agreement, graduate students of Duke University may take any graduate course offered by the Department of Classics of the University of North Carolina. A list of these courses will be sent upon request.

Computer Science

Professor Rose, *Chairman* (205 North); Professor Loveland, *Director of Graduate Studies* (205 North); Professors Gallie, Marinos, Patrick, A. Rosenberg, Starmer, Trivedi, Utku, and Woodbury; Associate Professors Ballard, Biermann, Kedem, and Wagner; Assistant Professors Douglas and Smith; Associate Research Professors Kootsey and Ramm; Adjunct Assistant Professor J. Rosenberg; Visiting Assistant Professor Bar-Yehuda

The Department of Computer Science offers programs leading to the A.M. and Ph.D. degrees. The Ph.D. program is a joint offering with the computer science department of the University of North Carolina at Chapel Hill.

A student entering graduate work in computer science should have had three semesters of calculus and one semester of linear algebra, and have a knowledge of data structures, and of assembler as well as higher-level computer programming languages. Research interests of present faculty include mathematical foundations of computer science, artificial intelligence, analysis of algorithms, programming methodology, real-time computing, operating data base systems, computer systems design and analysis, parallel processing systems, scientific computation (including numerical analysis), and very large-scale integration.

For Seniors and Graduates

200. Programming Methodology I. Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies, choice and effective use of programming languages and systems, psychology of computer programming, proof of correctness of programs, analysis of algorithms, and properties of program schemata. Prerequisite: Computer Science 152. 3 units. *Wagner*

201. Programming Languages. Information binding, data structures and storage, control structures, recursion, execution environments, input/output; syntax and semantics of languages; study of PL/I, Fortran, Algol, APL, LISP, SNOBOL, and SIMULA; exercises in programming. Prerequisite: Computer Science 200. 3 units. *Ballard or taught at UNC-CH as Comp 244*

202. Applied Discrete Structures. Aspects of discrete mathematics that are essential to the development of computer science. Topics from combinatorics and graph theory, discrete probability theory, and mathematical logic. Prerequisites: Mathematics 103 and 104 or equivalents. 3 units. *Staff*

204. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. Addressing structures and error recovery. Multivendor software compatibility. Economic trade-offs. International standards. Prerequisites: Computer Science 154 and Electrical Engineering 157. C-L: Electrical Engineering 204. 3 units. *Pitt*

207. Fault-Tolerant Computer Systems. C-L: Electrical Engineering 207. 3 units. *Marinos*

208. Digital Computer Design. C-L: Electrical Engineering 208. 3 units. *Marinos*

209. Microprocessor Fundamentals and Applications. C-L: Electrical Engineering 209. 4 units. *Carroll, George, or Marinos*

210. VLSI Systems: an Introduction. A first course in VLSI using the Mead-Conway approach. Topics include (1) the basic components of MOS technology: the transistor and gates constructed therefrom; (2) techniques for composing components into useful logic blocks: array logic, passive logic networks, sequential machines; (3) introduction to techniques for composing logic blocks into systems; and (4) introduction to software systems that aid the design process. Students will complete the design of a small system in NMOS. Prerequisite: Computer Science 157 or equivalent. 3 units. *Staff or taught at UNC-CH as Comp 268*

215. Artificial Intelligence. Heuristic versus algorithmic methods; programming of games such as chess; theorem proving and its relation to correctness of programs; readings in simulation of cognitive processes, problem solving, semantic memory, analogy, adaptive learning. Prerequisite: Computer Science 152 or consent of instructor. 3 units. *Ballard or Biermann*

221. Numerical Analysis I. Error analysis, interpolation and spline approximation, numerical differentiation and integration, solutions of linear systems, nonlinear equations, and ordinary differential equations. Prerequisites: knowledge of an algorithmic programming language and intermediate calculus. C-L: Mathematics 221. 3 units. *Gallie or Patrick*

222. Numerical Analysis II. Calculation of eigenvalues and eigenvectors, numerical methods for solving partial differential equations, and integral equations. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 222. 3 units. *Patrick or Utku*

224. Analysis of Algorithms. Design and analysis of efficient algorithms. Design techniques include recursion, divide-and-conquer, and dynamic programming. Applications include sorting, searching, dynamic structures, path-finding, fast multiplication, fast Fourier transform. Nondeterministic algorithms. Computationally hard problems. NP-completeness. This course is the same as Computer Science 124 with more advanced level work required of the student. Prerequisites: Computer Science 152 and four semesters of college mathematics. 3 units. *Loveland or Rosenberg*

225. Formal Languages and Theory of Computation. An introduction to the study of abstract machines and the languages they define, their capabilities and limitations. Finite-state automata, regular languages, pushdown automata, context-free languages, Turing machines, recursive functions and recursively enumerable sets, non-computable sets, measures of complexity for algorithms. Prerequisites: four semesters of undergraduate mathematics. 3 units. *Loveland or Rosenberg*

226. Mathematical Methods for Systems Analysis I. Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics,

queuing theory, and simulation. Prerequisites: four semesters of college mathematics. 3 units. *Trivedi*

227. Mathematical Methods for Systems Analysis II. Basic concepts and techniques used in the deterministic modeling of systems. Elements of linear algebra; linear, integer, dynamic, and geometric programming; and unconstrained and constrained optimization. Prerequisites: four semesters of college mathematics. 3 units. *Staff*

231. Introduction to Operating Systems. Basic concepts and principles of multi-programmed operating systems. Memory, CPU, I/O device management, and scheduling. Buffering techniques. Performance evaluation. Case studies of existing systems. Prerequisite: Computer Science 154. 3 units. *Smith, Trivedi, or taught at UNC-CH as Comp 242*

232. Compiler Construction. Models and techniques used in the design and implementation of assemblers, interpreters, and compilers. Lexical analysis, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation, and optimization techniques. 3 units. *Wagner*

241. Data Base Methodology. Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Prerequisites: Computer Science 154 and either 155 or 163. C-L: Mechanical Engineering and Materials Science 242. 3 units. *Starmer*

252. Computer Systems Organization. Hardware and software aspects. Processor, memory, device, and communication subsystems; case studies of hardware system organization, e.g., parallel, associative, fault-tolerant; organization of software systems to exploit hardware systems organization; economic and reliability aspects of various hardware organizations. Prerequisites: Computer Science 154 and 157. C-L: Electrical Engineering 252. 3 units. *Trivedi*

265. Advanced Topics in Computer Science. 3 units. *Staff*

For Graduates

308. Advanced Topics in Digital Systems. C-L: Electrical Engineering 308. 3 units. *Marinos*

310. CMOS VLSI Design. A second course in VLSI, aimed at the design of VLSI systems in CMOS. The main thrusts of the course will be (1) to provide enough background in the theory of CMOS circuits to understand circuit level trade-offs; (2) to introduce a symbolic design system and its supporting software, which greatly aid the design process; (3) to examine sample chip designs with an eye to understanding competitive design methodologies. Students will complete a CMOS-oriented project comprising the design and implementation of either a hardware or a software subsystem. Prerequisite: Computer Science 210 or equivalent. C-L: Electrical Engineering 310. 3 units. *Staff*

315. Advanced Topics in Artificial Intelligence. Course content will vary from year to year and will include a detailed study of one or more of the following: mechanical theorem proving, natural language processing, automatic program synthesis, machine learning and inference, representations of knowledge, languages for artificial intelligence research, artificial sensorimotor systems, and others. Prerequisite: Computer Science 215. 3 units. *Ballard, Biermann, or Loveland*

316. Computational Linguistics. A historical and technical introduction to the computer processing of English or other natural language inputs, with emphasis on

such applications as data base query, programming, and office automation. Topics will include techniques for the morphological, syntactic, semantic, and pragmatic analysis of English. Recent developments in the area will also be studied. Students will write a short paper and/or do a project. Prerequisite: Computer Science 215. 3 units. *Ballard or Biermann*

320. VLSI Algorithmics. Algorithmic and systems aspects of VLSI. Topics include theoretical studies of the layout problem, array logic, placement and routing, fault-tolerance in VLSI designs, design for testability, the design of networks of processors, and cost trade-offs in VLSI designs. Each student will complete an in-depth study of a topic approved by the instructor. Prerequisites: Computer Science 224 and either 210 or 310. 3 units. *Rosenberg*

326. Systems Modeling. Advanced study of analytical models of systems; queuing model and its parameterization and validation. Methods for computer solutions of some models. Prerequisites: Computer Science 226 and 231. 3 units. *Trivedi*

331. Operating Systems Theory. Advanced study of theoretical aspects of operating systems emphasizing models and control of concurrent processes, processor scheduling, and memory management. Prerequisites: Computer Science 226 and 231. 3 units. *Trivedi or Wagner*

COURSES CURRENTLY UNSCHEDULED

301. Topics in Programming Theory

321. Topics in Numerical Mathematics

325. Theory of Computation

332. Topics in Operating Systems

SUPPLEMENTARY COURSES OFFERED AT UNC-CH

Comp 145. Software Engineering Laboratory

Comp 171. Natural Language Processing

Comp 230. File Management Systems

Comp 236. Computer Graphics

Comp 238. Raster Graphics

Comp 254. Picture Processing and Pattern Recognition

Comp 265. Architecture of Computers

Economics

Professor Weintraub, *Chairman* (215A Social Science); Professor Grabowski, *Director of Graduate Studies* (301 Social Science); Professors Clotfelter, Cook, Davies, Geweke, Gillis, Goodwin, Graham, Havrilesky, Kelley, Tower, Treml, Vernon, Wallace, and Yohe; Associate Professors de Marchi, McElroy, and Tauchen; Assistant Professors Brock, C. Conrad, R. Conrad, Kimbrough, Luger, Marshall, Nickerson, Shetty, Stahl, and Zarkin

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. Among the undergraduate courses of distinct advantage to the graduate student in economics are statistics, economic theory, and basic courses in philosophy, mathematics, and social sciences other than economics. Advanced work in mathematics or statistics is also useful.

Requirements for the Ph.D. degree in economics include courses in economic theory, quantitative methods, and econometrics in the first year, and at the end of the second year, an examination in economic analysis. In addition, a student must obtain certification in three fields, one of which may be in an outside minor. The student may select from advanced economic theory, history of political economy, economic development, economic history, international economics, money and banking, labor economics, public finance, industrial organization, econometrics, statistics, Soviet economics, corporate economics, and certain fields outside the economics department (e.g., demography). Course work for the Ph.D. degree should be completed in five semesters of residence.

For Seniors and Graduates

200. Capitalism and Socialism. Selected ideological classics of new and old, right and left economics including both "counsels for perfection" (utopias) and "precepts for action" in political economy. Prerequisites: Economics 149 and 154 or consent of instructor. 3 units. *Staff*

201S, 202S. Current Issues in Economics. Economic analysis of such issues as the health care system, crime and punishment, pollution and the environment, the performing arts, welfare, and the energy crisis. Prerequisites: Economics 138 and 139, and, for Economics 202S, Economics 201S. 3 units. *Davies*

204S. Advanced Monetary Economics. Monetary theory and its statistical and institutional implementation. Particular attention to the development of aggregative theories of prices, interest rates, and production; the functioning of monetary policy within various theoretical frameworks; appraisal of recent use and limitations of Federal Reserve policy. Prerequisite: Economics 153. 3 units. *Havrilesky or Yohe*

205S. Advanced Monetary Theory and Policy. Emphasis on recent issues: innovations in the payments mechanism and new monetary aggregates, the subterranean economy, financial crises, alternative views of the monetary policy transmission mechanism, and the monetarist-fiscalist controversy. Prerequisite: Economics 138 and 153. 3 units. *Havrilesky or Yohe*

212S. Economic Science and Economic Policy. A historical examination of the impact of economics on public policy; topics vary each semester and have included energy and anti-inflation policy, productivity growth, the Third World, and the Council of Economic Advisers. 3 units. *Goodwin*

213S.1. The Economics of Slavery in the American South. The nature, development, economics and social consequences of slavery in the United States during the nineteenth century. Prerequisites: Economics 149 and consent of instructor. 3 units. *Coats*

218. Macroeconomic Policy. Does not count for economics major requirements. C-L: Public Policy Studies 218. 3 units. *Luger*

219S. Economic Problems of Underdeveloped Areas. Analysis of underdeveloped countries with some attention to national and international programs designed to accelerate development. Prerequisite: Economics 149 or consent of instructor. 3 units. *Kelley or Brock*

232. Analytical Methods IV: Topics in Economic Policy. Does not count for economics major requirements. C-L: Public Policy Studies 232. 3 units. *Gillis*

234. Urban and Regional Economics. Presents models: to analyze metropolitan systems and the location of economic activity; to understand the causes of selected urban and regional problems, including unbalanced growth and development, poor

housing conditions, residential segregation, deteriorating services, and fiscal crises; and to assess the impact of public policies toward states and substate areas. Prerequisite: Economics 149 or consent of instructor. 3 units. *Clotfelter or Luger*

237. Statistical Methods. A study of statistical methods appropriate for dealing with problems in business and social science. In addition to developing more thoroughly the subject considered in business statistics, the following methods will be considered: simple, multiple, partial, and curvilinear correlation; curve fitting; probability; sampling distributions; and statistical inference. Prerequisite: Economics 138 or consent of the instructor. 3 units. *Staff*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. Prerequisites: Economics 149 and 237 or equivalents. 3 units. *Marshall, McElroy, Tauchen, or Wallace*

244. Corporate Economics I. Strategic planning models of the firm including marginal analysis, mathematical programming, portfolio, and corporate simulation models. Economics as the language of corporate planning and modeling. Prerequisites: Economics 138 and 149 or equivalents. 3 units. *Naylor*

245. Econometrics II. Advanced theory and applications: includes specification error, generalized least squares, lag structures, Bayesian decision making, simultaneous equation methods, and forecasting. Emphasis on current applied literature. Prerequisite: Economics 243. 3 units. *McElroy, Tauchen, or Wallace*

246. Selected Topics in Econometric Theory. Analysis of panel data, combining data from different sources, vector autoregressive methods, problems of causation in time series data, nonlinear estimation, limited dependent variables, sample selection bias, and other topics to be chosen subject to the interests of the class. 3 units. *Geweke, Tauchen, or Wallace*

247S. Applied Econometrics. Application of current developments in econometric methodology to empirical problems in economics. Emphasis on the conduct of empirical research, including model and hypothesis formulation, testing, and integration of economic and econometric theory. 3 units. *Geweke, Marshall, McElroy, Tauchen, and Wallace*

250S. Modern Economic Thought. Integrated survey of the several major streams of economic theory since 1936. Selected topics from the economics of Keynes, its offshoots and coordinate developments, and post-Marxian economic theory. Historical evolution of recent ideas and their interrelations. Prerequisite: Economics 138 and 149 and 154 or consent of instructor. 3 units. *de Marchi or Weintraub*

265S. International Trade and Finance. Fundamental principles of international economic relations. The economic basis for international specialization and trade and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisites: Economics 149 and 154. 3 units. *Brock, Kimbrough or Tower*

268. Federal Tax Policy. Does not count for economics major requirements. C-L: Public Policy Studies 268 and Law 518. 3 units. *Clotfelter or Schmalbeck*

286S. Economic Policy Making in Developing Countries. Does not count for economics major requirements. C-L: Public Policy Studies 286S. 3 units. *Gillis*

287. Public Finance. Economic aspects of such problems as the growth of government, the proper role of the state, the centralization and decentralization of gov-

ernment, government bureaucracy, the impact of taxes and spending on the wealthy and the poor, as well as other public policies and questions. 3 units. *R. Conrad or Davies*

293. Soviet Economic History. Establishment of foundations of a socialist economy: collectivization, industrialization, and search for economic efficiency. 3 units. *Trembl*

294S. Soviet Economic System. Economic planning and administration in the Soviet Union and other socialist countries. International comparisons. Theoretical and applied problems of resource allocation, economic development, and optimal micro decision making in a nonmarket economy. 3 units. *Trembl*

For Graduates

301. Microeconomic Analysis I. Review of contemporary theory relating to production, the firm, and income distribution in competitive and imperfectly competitive markets. 3 units. *Graham*

302. Microeconomic Analysis II. A continuation of Economics 301 with emphasis on analyses of consumer behavior, general equilibrium, welfare economics, and capital theory. Prerequisite: Economics 301. 3 units. *Staff*

304, 305. Monetary Theory and Policy. 304: theories of the supply of and demand for money (neoclassical and Keynesian macroeconomic), general equilibrium theories, and theories of the term structure of interest rates. 305: the theory and practice of monetary policy with emphasis on recent issues, the monetarist-fiscalist controversy, the monetary policy transmission mechanism, and policy simulations with econometric models. 3 units each. *Havrilesky or Yohe*

307. Quantitative Analysis I. A systematic analysis of the principal quantitative methods used in microeconomic theory. Neoclassical theories of production and distribution are used as vehicles for presenting the material. Considerable emphasis is placed on the application of mathematical analysis to economic models. 3 units. *Weintraub*

308. Quantitative Analysis II. Dynamic optimization techniques, including the calculus of variations and optimal control, are analyzed and applied to problems involving capital accumulation, resource extraction, and aspects of firm behavior. 3 units. *Graham, Nickerson or Stahl*

311, 312. History of Political Economy. A detailed review of the development of economic theory, the tools of economic analysis, and economics as a science, together with an analysis of the circumstances affecting this development. Period covered: pre-Christian times through 1936. 3 units each. *Goodwin*

313, 314. Seminar in Economic Theory. Prerequisite: Economics 301 or equivalent. 3 units each. *Weintraub*

317. Seminar in Demographic, Population, and Resource Problems (Development Economics I). Historical, empirical, and theoretical topics in development economics focusing on real aspects of growth in a closed economy. Special attention to human resource economics (demography, education, nutrition), models of dualism, agricultural growth, and technology. 3 units. *Brock or Kelley*

319. Seminar in the Theory and the Problems of Economic Growth and Change (Development Economics II). Links between aid, financial markets, and real investment in an open economy stressing tariff protection and capital controls (internal and external). Economic policy making using market solutions and/or planning models (input-output, linear programming, and computable general equilibrium). 3 units. *Brock*

320. Macroeconomic Analysis I. Measurement of national income and other important aggregates; classical macroeconomics; Keynesian and more recent views of the determinants of income, employment, and price levels; empirical studies of consumption, investment, and monetary variables. 3 units. *Geweke*

322. Macroeconomic Analysis II. Further analysis of topics treated in Economics 320. Optimal economic growth; business cycles. Issues in economic policy. Prerequisite: Economics 320. 3 units. *Geweke or Tauchen*

323. Income Distribution Theory. Functional and personal income distributions. Concepts and measures of poverty and inequality. Ethical and economic maldistribution issues. Pricing of productive services, primary attention on wages and employment. Rival aggregative (macrodistribution) theories. Prerequisites: intermediate micro- and macroeconomics and some knowledge of calculus and statistics. 3 units. *Staff*

329. Federal Finance. An analysis of the trends and hypotheses concerning the growth in governmental activity, the optimum level and composition of governmental spending, and the microeconomic and macroeconomic effects of governmental spending and tax policies. 3 units. *Clotfelter, R. Conrad, or Davies*

330. Seminar in Public Finance. 3 units. *Staff*

350. Modern Economic Thought. Principles of microeconomics in the analysis of problems and policies. The particular contextual materials that will be subjected to analysis will vary. Materials will be treated in the tradition of positive economics. 3 or 6 units. *Staff*

355. Seminar in Labor Economics. 3 units. *McElroy or Zarkin*

358. Seminar in Labor Market and Related Analysis. 3 units. *McElroy or Zarkin*

359. Economic Analysis of Legal Issues. An exploration of diverse topics in law and economics such as property rights and externalities, tort law and optimal accident prevention, bargaining and game theory, the economics of contracts, and theories of economic justice. C-L: Law 359. 3 units. *Culp*

365. Seminar in International Trade Theory and Policy. 3 units. *Tower*

366. Seminar in International Monetary Theory. 3 units. *Kimbrough*

380. Graduate Economics Workshops. For postpreliminary students. May be taken for multiple credit. Sections: 01. Industrial Organization and Regulation; 02. International Economics; 03. Labor Economics; 04. Macroeconomics; 05. Public Finance; 06. Economic Thought; 07. Corporate Economics; 08. Applied Econometrics. 3 units each. *Staff*

388. Industrial Organization. The theory, measurement, and history of the firm-structure of industry. Emphasis upon the structure of American industry and upon actual production and pricing practices. Criteria for evaluating industrial performance. 3 units. *Vernon or Grabowski*

389. Seminar in Industrial and Governmental Problems. 3 units. *Vernon or Grabowski*

397, 398. Directed Research. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

233. Economics of State and Local Governments

235. The Economics of Crime, Law Enforcement, and Justice

- 285. Evaluation of Public Expenditures
- 303. Theory of Economic Decision Making
- 316. Seminar in Economics of Soviet-Type Socialism
- 321. Theory of Quantitative Economic Policy
- 331. Seminar in Economic History
- 345, 346. Demographic Techniques I and II
- 401. Seminar on the British Commonwealth
- 402. Interdisciplinary Seminar in the History of the Social Sciences

RELATED COURSES IN OTHER DEPARTMENTS

Courses in related fields may be selected from anthropology, computer science, forestry, history, mathematics, philosophy, political science, public policy sciences, and sociology, or from an area that complements the candidate's area of research interests in economics.

See the Center for Demographic Studies in the chapter "Special and Cooperative Programs" for further information.

Education

Associate Professor Davis, *Chairman* (213 West Duke); Professor Gehman, *Director of Graduate Studies* (07 West Duke); Professor Page; Associate Professors Ballantyne, Carbone, Di Bona, Johnson, and Sawyer; Adjunct Associate Professors Martin and Pittillo; Lecturers Fowler and Leach

For students admitted to graduate programs prior to fall 1981, specific requirements may be obtained in the Graduate School office. Qualified juniors, seniors, and graduate students may enroll in appropriate education courses as electives.

For Seniors and Graduates

211. Education and the Mass Media. Impact of mass media on behavior, particularly of children. 3 units. *Di Bona*

215S. Secondary Education: Principles. Principles, curriculum, and methods in secondary education. Prerequisite: C average overall and in teaching field or fields. Must be accompanied by Education 216. 3 units. *Carbone and staff*

216. Secondary Education: Internship. Supervised internship in junior and senior high schools. Full time for half a semester. 6 units. *Carbone and staff*

225. The Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. 3 units. *Carbone and staff*

227. Contemporary Theories of Counseling and Psychotherapy. Prerequisites: two courses in psychology or educational psychology. 3 units. *Staff*

232. Psychoeducational Counseling with Families. Individual and group counseling concerning psychoeducational problems of families. Prerequisite: consent of instructor. 3 units. *Ballantyne and Davis*

236. Teaching Developmental and Remedial Reading in the Secondary School. Principles, methods, and materials for the development of effective reading attitudes and skills in developmental and remedial programs. 3 units. *Staff*

242. Group Counseling. Theories and techniques of counseling for small groups of children, adolescents, teachers, parents, and other adults. Prerequisite: consent of instructor. 3 units. *Ballantyne*

246. Teaching of Mathematics. Aims, curriculum, and classroom procedure for teaching secondary school mathematics. 3 units. *Staff*

276. Teaching of High School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary school science. 3 units. *Staff*

For Graduates

350, 351. Directed Activities in Education. Internship experiences at an advanced level under supervision of appropriate staff. Prerequisite: consent of instructor. 3 units each. *Staff*

357. Directed Research. For students who have passed the preliminary examination. 1 to 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

205. Selected Topics

248. Practicum in Counseling

Engineering

Earl H. Dowell, Sc. D., *Dean* (305 Teer Engineering Library Building)

The School of Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees with a major in biomedical, civil and environmental, or electrical engineering, or in mechanical engineering and materials science. These programs are designed to provide a fundamental understanding of the engineering sciences, which are based on mathematics and the physical sciences, and to develop experience in the art of engineering, which includes strong elements of intuition, imagination, and judgment. Engineering graduate students may participate in seminars appropriate to their fields of study.

A *minimum* of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (usually mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department, and 6 for a research-based thesis. A nonthesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A *minimum* of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree. In civil and environmental engineering and electrical engineering, 24 units are required in the major field and 12 units in a related minor field (often mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department, and 12 for a research-based dissertation. In biomedical and mechanical engineering there are no specific course requirements; each program is planned to meet individual needs. Doctoral students are required to pass qualifying and preliminary examinations which may be either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

BIOMEDICAL ENGINEERING

Professor McElhaney, *Chairman* (136 Engineering); Professor Plonsey, *Director of Graduate Studies* (276 Engineering Annex); Professors Barr, Clark, Hammond, Hochmuth, Lochmüller, Nolte, Pilkington, Thurstone, and Wolbarsht; Associate Professors Burdick and von Ramm; Assistant Professors Miller and Riederer

Biomedical Engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modelling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The goal of the graduate program in biomedical engineering is to combine training in advanced engineering, biomedical engineering, and the life sciences so that graduates of the program can contribute at the most advanced professional level. The doctoral dissertation should demonstrate significant and original contributions to an interdisciplinary topic, accomplished as an independent investigator. The major, current, research areas are: biomechanics, biomedical materials, biomedical modelling, data acquisition and processing, medical imaging, and electrophysiology. Every biomedical engineering graduate student is required to serve as a teaching assistant as part of the graduate training.

201. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Student chooses a relevant topic area for detailed study and report. Not open to students who have taken Biomedical Engineering 101 or equivalent. 3 units. *Plonsey*

202. Biomedical Transfer Processes. An introduction to biomedical diffusion and momentum transfer with particular emphasis on physical models of biological and artificial organ systems. 3 units. *Clark and Hochmuth*

205, 206. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects, including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and correct faults, and final design evaluation. Evaluation includes examination of complexity, reliability, and cost. Design and construction oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. Prerequisites for 205: Engineering 51 and Biomedical Engineering 163, 164 or equivalents; for 206: satisfactory work in 205. 4 units each. *Barr, Hammond, and von Ramm*

211. Theoretical Electrophysiology. Mathematical analysis of intracellular and extracellular currents and voltages arising from subthreshold and transthreshold stimuli applied to excitable tissue (cardiac and striated muscle and nerve). Bases for and behavior of models of cardiac tissue utilizing discrete and continuous formulations. Evaluation of sources of extracellular fields. Description of, and evaluation of, models of membrane behavior. Laboratory exercises based on computer simulation, with emphasis on quantitative behavior and design. Readings from original literature. Prerequisite: Biomedical Engineering 101 or 201. 4 units. *Plonsey and Barr*

212. Theoretical Electrocardiography. Mathematical analysis of currents flowing between the cardiac and body surfaces. Consideration of cardiac models, inhomogeneities, and surface lead systems. Examination of lead systems, and the interpretation of body surface measurements using inverse calculations. Laboratory exercises based on computer simulation with emphasis on quantitative behavior and design.

Readings from the original literature. Prerequisite: Biomedical Engineering 101 or 201. 4 units. *Barr and Plonsey*

215. Biomedical Materials and Artificial Organs. Chemical structures, processing methods, evaluation procedures, and regulations for materials used in biomedical applications. Applications will include implant materials, components of *ex vivo* circuits, and cosmetic prostheses. Primary emphasis will be placed on polymer-based materials and on optimization of parameters of materials which determine their utility in applications such as artificial kidney membranes and artificial arteries. Prerequisite: Engineering 83 or Chemistry 151 or consent of instructor. C-L: Mechanical Engineering 215. 3 units. *Clark*

222. Principles of Ultrasound Imaging. Propagation, reflection, refraction, and diffraction of acoustic waves in biologic media. Topics include geometric optics, physical optics, attenuation, and image quality parameters such as signal-to-noise ratio, dynamic range, and resolution. Emphasis is placed on the design and analysis of medical ultrasound imaging systems. Prerequisites: Physics 52 and Mathematics 111. 3 units. *von Ramm*

230. Biomechanics. Basic elements of mechanics are developed with application in biomechanics. Primary emphasis is given to trauma mechanisms, injury criteria, and human protection. Head and neck injuries and helmet design are discussed. Case studies from product liability lawsuits with a strong biomechanics context are discussed in a seminar mode. 3 units. *McElhaney*

233. Modern Diagnostic Imaging Systems. The underlying concepts and instrumentation of several modern medical imaging modalities. Review of applicable linear systems theory and relevant principles of physics. Modalities studied include X-ray radiography (conventional film-screen imaging and modern electronic imaging), computerized tomography (including the theory of reconstruction), and nuclear magnetic resonance imaging. Prerequisite: consent of instructor. 3 units. *Riederer*

235. Acoustics and Hearing. This course covers the generation and propagation of acoustic (vibrational) waves and their reception and interpretation by the auditory system. Topics under the heading of generation and propagation include free and forced vibrations of discrete and continuous systems, resonance and damping, and the wave equation and solutions. To understand the reception and interpretation of sound, the anatomy and physiology of the mammalian auditory system are presented, and the mechanics of the middle and inner ears studied. Prerequisites: Physics 52 and Mathematics 111 or equivalents. 3 units. *Miller*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Prerequisites: consent of Chairman and instructor. 1 to 4 units. *Staff*

For Graduates

333. Biomedical Imaging. A study of the fundamentals of information detection, processing, and presentation associated with imaging in biology and medicine. Analysis of coherent and incoherent radiation and various image generation techniques. Also covered will be the psychometrics of image evaluation dealing with subjective and objective parameters. Emphasis will be placed upon sonography, thermography, X-ray, various forms of nuclear radiography, microscopy, and holography. 3 units. *Thurstone*

399. Special Readings in Biomedical Engineering. Individual readings in advanced study and research areas of biomedical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units each. *Staff*

COURSES CURRENTLY UNSCHEDULED

204. Measurement and Control of Cardiac Electrical Events

207. Experimental Mechanics

221. Electrophysiological Techniques

243. Computers in Biomedical Engineering

311. Inverse Models

CIVIL AND ENVIRONMENTAL ENGINEERING

Professor Melosh, *Chairman* (121 Engineering); Associate Professor Petroski, *Director of Graduate Studies* (126 Engineering); Professors Muga, Utku, Vesilind, and J. F. Wilson; Associate Professors Biswas, Bryers, Medina, Pas, and Peirce; Assistant Professors Marin and Reckhow; Adjunct Professor Saibel

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree: environmental engineering; geotechnical engineering and soil mechanics; mechanics of solids; materials engineering; fluid mechanics, water resources, and ocean engineering; structural engineering; and urban systems and transportation. Interdisciplinary programs combining study in some of the major areas with biological sciences, business administration, materials science, social sciences, political science, public policy studies, and other areas of engineering are also available.

With the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete an additional 6 units of course work plus a special project. If this alternative is elected, candidates are expected to take comprehensive examinations over their graduate course work, and also to defend orally their special projects.

Under the Reciprocal Agreement with Neighboring Universities, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although related work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social or managerial sciences may take relevant work in these areas.

201. Advanced Mechanics of Solids. Tensor fields and index notation. Analysis of states of stress and strain. Conservation laws and field equations. Constitutive equations for elastic, viscoelastic, and elastic-plastic solids. Formulation and solution of simple problems in elasticity, viscoelasticity, and plasticity. 3 units. *Petroski*

204. Plates and Shells. Differential equation and extremum formulations of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian plates of isotropic and orthotropic material. Solution methods. Differential equation formulation of thin shell problems in curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution, and plates. Extremum formulation of shell problems. Solution methods. Prerequisites: Mathematics 111 and Engineering 75 or 135. 3 units. *Utku*

205. Elasticity. Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and plane problems by semi-inverse, complex potential, and variational methods. Three-dimensional problems. Prerequisite: Civil and Environmental Engineering 201 or equivalent. 3 units. *Petroski*

212. Mechanical Behavior and Fracture of Materials. Historical perspective on structural failure. Fracture mechanics and its application to brittle and ductile fracture;

fatigue in structural materials. Analysis of load spectra; fatigue crack growth calculations. 3 units. *Petroski*

215. Urban and Regional Systems Analysis. Identification, formulation, and solution of urban and regional systems problems. Models of population growth and distribution, spatial activity allocation models. Design and analysis of experiments for resource recovery, waste disposal, and transportation planning. Application of matrix algebra in the design and analysis of solid waste processing and resource recovery. Optimization of public service delivery systems, including solid waste collection and disposal, resource recovery, water supply systems, and transportation networks. 3 units. *Pas*

216. Transportation Planning and Policy Analysis. Issues in policy planning and decision making in urban and intercity transportation systems. Transportation legislation. Emphasis on analysis and understanding of government transportation programs and policy. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. C-L: Public Policy Studies 254. 3 units. *Pas*

217. Transportation Systems Analysis. The transportation systems planning process. Quantitative analysis, mathematical modeling and computer simulation techniques for short- and long-range planning and evaluation of transportation systems. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. 3 units. *Pas*

218. Engineering Management and Project Evaluation. Statistical analysis and economics. Data organization, distributions, estimates of parameters, hypothesis testing, analysis of variance. Economic impact assessment, supply and demand forecasting, benefit/cost analysis, economic incentives, public and private finance, input/output analysis. 3 units. *Peirce*

225. Dynamic Engineering Hydrology. Dynamics of the occurrence, circulation, and distribution of water; hydrometeorology; geophysical fluid motions. Precipitation, surface runoff and stream-flow, infiltration, water losses. Hydrograph analysis, catchment characteristics, hydrologic instrumentation, and computer simulation models. Prerequisite: Civil and Environmental Engineering 122 or consent of instructor. 3 units. *Medina or Muga*

226. Operational Hydrology. Frequency, risk, and regional analyses in hydrology. Stochastic processes and mathematical models, correlation and spectral analyses, synthesis of hydrologic data. Linear systems theory applied to the rainfall-runoff process, convolution and the instantaneous unit hydrograph. Criteria for hydrologic instruments and design of optimum networks. Prerequisite: Civil and Environmental Engineering 123 or Mathematics 135 or consent of instructor. 3 units. *Medina*

227. Groundwater Hydrology and Contaminant Transport. Review of surface hydrology and its interaction with groundwater. The nature of porous media, hydraulic conductivity, and permeability. General hydrodynamic equations of flow in isotropic and anisotropic media. Water quality standards and contaminant transport processes: advective-dispersive equation for solute transport in saturated porous media. Analytical and numerical methods, selected computer applications. Deterministic versus stochastic models. Applications: leachate from sanitary landfills, industrial lagoons and ponds, subsurface wastewater injection, monitoring of groundwater contamination. Conjunctive surface-subsurface models. Prerequisites: Civil and Environmental Engineering 122 and 123 or consent of instructor. 3 units. *Medina*

232. Reinforced Concrete Design. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, and shear and diagonal ten-

sion. Two-way slab and flat plate design. Prerequisite: Civil and Environmental Engineering 133. 3 units. *Biswas*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. Prerequisite: Civil and Environmental Engineering 133. 3 units. *Biswas*

234. Advanced Structural Design in Metals. Design of metal structures using limit-state theory. Critical review of the basis for Load and Resistance Factor Design (LRFD) specifications. Application to bridge, building, offshore and aerospace structures. Evaluation of contemporary structural systems for planning and preliminary design. Prerequisite: Civil and Environmental Engineering 134 or equivalent. 3 units. *Biswas*

235. Foundation Engineering. An introduction to methods of analysis, design, and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration, excavation and bracing, drainage and stabilization, and underpinning. Foundation vibrations. 3 units. *Staff*

236. Earth Structures. An introduction to methods of analysis, design, and construction of earth structures such as dams, embankments, cuts, canals, and airfield and highway pavements. Selection of materials, soil compaction, and stabilization. Theory of seepage, design of wells and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. 3 units. *Staff*

241. Environmental Engineering Chemistry and Biology. Inorganic and organic chemistry as applied to water and wastewater treatment. Chemical equilibria and kinetics. Population dynamics and energy transfer in metabolic systems. Instrumental analysis, including spectrophotometry, chromatography, and atomic adsorption. Atmospheric chemistry and analytical methods. Prerequisite: Civil and Environmental Engineering 124. 3 units. *Bryers*

243. Unit Operations in Water Treatment. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. Prerequisite: Civil and Environmental Engineering 124 or consent of instructor. 3 units. *Vesilind*

245. Pollutant Transport Systems. Distribution of pollutants in natural waters and the atmosphere, diffusive and advective transport phenomena within the natural environment and through artificial conduits and storage/treatment systems. Analytical and numerical prediction methods. Prerequisites: Civil and Environmental Engineering 122 and Mathematics 111 or equivalents. 3 units. *Medina*

246. Water Supply Design. The study of water resources and municipal water requirements including reservoirs, transmission, treatment and distribution systems; methods of collection, treatment, and disposal of municipal and industrial wastewaters. The course includes the preparation of a comprehensive engineering report encompassing all aspects of municipal water and wastewater systems. Field trips to be arranged. Prerequisite: Civil and Environmental Engineering 124 or consent of instructor. 3 units. *Vesilind*

248. Solid Waste and Resource Recovery Engineering. Engineering design of resource recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Energy recovery and recycling municipal refuse. Collection, treatment, and disposal of solid wastes from wastewater treatment. Prerequisite: Civil and Environmental Engineering 124 or consent of instructor. 3 units. *Vesilind*

249. Control of Hazardous and Toxic Waste. Solutions to industrial and municipal hazardous waste management problems. Handling, transportation, processing, storage, and disposal technologies. Upgrading an abandoned disposal site. Economic and regulatory aspects. Case studies. Prerequisite: consent of instructor. 3 units. *Peirce*

251. Systematic Engineering Analysis. Mathematical formulation and numerical analysis of discrete engineering systems with emphasis on theory of structures. Equilibrium and propagation problems in continuum; properties of these systems and their discretization by the trial functions with undetermined parameters. The use of weighted residual methods, finite elements, and finite differences. Prerequisite: senior or graduate standing. 3 units. *Utku*

254. Applications of Finite Element Analysis. Theory of element and material models; models of metals, rock, reinforced concrete, wood, glass, soil, water, and air; analyses of torsion members, shear walls, membranes, plates, shells, solids, and compound structural systems; analysis of soil-structure and fluid-structure systems; prediction of field heating, seepage, and pollution. Prerequisite: Civil and Environmental Engineering 251 or consent of instructor. 3 units. *Melosh*

258. Analysis of Dynamic and Nonlinear Behavior of Structures. Computation of nonlinear response by discretization; models for simulation of geometric, material, and boundary constraint nonlinearities; analysis of limit loads, bifurcations, and snap-through; simulation of super-elastic, plastic, viscoelastic, and slipping materials; prediction of collapsing, ballooning, gapping, metal forming, and welding behavior. Prerequisite: Civil and Environmental Engineering 251 or consent of instructor. 3 units. *Melosh or Utku*

265. Advanced Topics in Civil and Environmental Engineering. Opportunity for study of advanced subjects relating to programs within the civil and environmental engineering department tailored to fit the requirements of a small group. 1 to 3 units. *Graduate staff*

280. Engineering Aspects of Physical Oceanography. Study of the dynamic ocean processes of concern to the design engineer. Hydrometeorology, surface wind distribution, mechanics of generation and propagation of surface water waves, theory of periodic waves (linear and nonlinear), wave spectral descriptive models, astronomical tides, storm surge, impulsively generated waves (tsunamis), and wind- and wave-induced forces on various obstructions. Attention is focused on hindcasting-forecasting techniques and selection of design (wave spectra) criteria in terms of specified risk levels. 3 units. *Muga*

281. Experimental System Engineering. Formulation of experiments; Pi theorem and principles of similitude; data acquisition systems; static and dynamic measurement of displacement, force, and strain; interfacing experiments with digital computers for statistical data analysis; students select, design, perform, and interpret laboratory-scale experiments in areas of fluid systems including environmental and ocean engineering, and in solid systems including structural and basic material behavior. 3 units. *J. F. Wilson*

282. Port, Harbor, and Coastal Engineering. An intensive study of the various types of marine and coastal structures and their functions. Procedures for developing preliminary design alternatives and final design selection will be illustrated via the case history approach. Structures to be considered include piers (solid and open faced), seawalls and bulkheads, breakwaters, jetties, groins, outfalls, pipelines, moored cable array systems, and floating terminals. Each case history will be followed from conception and initial planning through the design stage to construction and postproject evaluation. Normally, there will be an opportunity to participate in an ongoing project. Prerequisite: Civil and Environmental Engineering 280. 3 units. *Muga*

283. Ocean System Dynamics. Formulation of dynamic models for discrete and continuous structures, normal mode analysis, deterministic and stochastic responses to shocks and environmental loading (earthquakes, winds, and waves), introduction to nonlinear dynamic systems, analysis and stability of structural components (beams and cables and large systems such as offshore towers, moored ships, and floating platforms). 3 units. *J. F. Wilson*

301, 302. Fall and Spring Seminars. Current topics in civil and environmental engineering theory and practice. No credit. *Director of Graduate Studies*

399. Special Readings in Civil and Environmental Engineering. Special individual readings in a specific area of study in civil and environmental engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units. *Graduate staff*

COURSES CURRENTLY UNSCHEDULED

202. Advanced Mechanics of Solids II

210. Intermediate Dynamics

221. Incompressible Fluid Flow

222. Open Channel Flow

223. Flow Through Porous Media

231. Structural Engineering Analysis

238. Rock Mechanics

239. Physical Properties of Soils

247. Air Pollution Control

306. Plasticity

336. Advanced Soil Mechanics

337. Elements of Soil Dynamics

350. Advanced Engineering Analysis

ELECTRICAL ENGINEERING

Professor Casey, *Chairman* (130 Engineering); Professor Marinos, *Director of Graduate Studies* (173 Engineering); Professors Fair, Joines, Kerr, Nolte, Owen, Pilkington, Wang, and T. G. Wilson; Associate Professors Hacker and Trivedi; Assistant Professors Carroll, George, and Massoud

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: computer-aided design, computer engineering, detection and estimation theory, digital signal processing, electromagnetic fields and microwaves, integrated circuit design and fabrication, microprocessor systems, robotics and control systems, solid-state devices and materials, solid-state power conditioning, and VLSI circuit design.

Recommended prerequisites for the graduate courses in electrical engineering include a knowledge of basic mathematics and physics, electric networks, and system theory. Students in doubt about their background for enrollment in specific courses should discuss the matter with the Director of Graduate Studies. The M.S. degree program includes either a thesis or a project and an oral examination. A qualifying examination is required for the Ph.D. degree program. This examination is intended to test both the breadth and depth of the student's understanding of basic electrical engineering concepts. There is no foreign language requirement.

202. Digital Communication Systems. Data communications and the transmission of information over noisy digital channels. Binary signaling via ASK, FSK, PSK. Time division multiplexing; telephone data systems; satellite television transmission. Effect of noise on coherent detection of digital signals; keying and pulse shaping techniques for reliable binary signaling; error detecting and correcting codes. Optimum digital receivers for noisy channels; error probabilities for optimum MAP receivers. Prerequisite: Electrical Engineering 186, and Mathematics 117 or 135 or Electrical Engineering 203, or permission of instructor. 3 units. *Kerr or Nolte*

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. 3 units. *Kerr, Nolte, or Wang*

204. Computer Network Architecture. Prerequisites: Computer Science 154 and Electrical Engineering 157. C-L: Computer Science 204. 3 units. *Pitt*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. Prerequisite: Electrical Engineering 203 or consent of instructor. 3 units. *Nolte*

206. Digital Signal Processing. Introduction to the fundamentals of processing signals by digital techniques with applications to practical problems. Discrete time signals and systems, elements of the Z-transform, discrete Fourier transforms, digital filter design techniques, fast Fourier transforms, and discrete random signals. 3 units. *Nolte*

207. Fault-Tolerant Computer Systems. Test generation and diagnostic program development for detection and location of faults in digital networks, digital system simulation as a diagnostic tool for test generation and verification of the initial system design, design of self-checking and fault-tolerant digital systems, and effectiveness evaluation of various redundancy schemes and fault-tolerant computer architectures. C-L: Computer Science 207. 3 units. *Marinos*

208. Digital Computer Design. Structural organization and hardware design of digital computer systems. Arithmetic unit, switching matrices, memory organization, central processing unit (CPU), I/O unit, and microprogram control. Detailed design and simulation of a general-purpose computer system. Computer systems based on cellular structures, hardware compilers, and parallel processing architectures are also discussed. Prerequisite: Electrical Engineering 157 or consent of instructor. C-L: Computer Science 208. 3 units. *Marinos*

209. Microprocessor Fundamentals and Applications. Various state-of-the-art microprocessor chips and their associated instruction sets, microcomputer architectures, comparative study of various microprocessor designs, microprocessor-based system design illustrated by several carefully selected design projects. Prerequisites: Electrical Engineering 157 and consent of instructor. Fall. C-L: Computer Science 209. 4 units. *Carroll, George, or Marinos*

210. Introduction to VLSI Systems. A study of devices, circuits, fabrication technology, logic design techniques, and system architecture intended to provide the student with an understanding of the underlying physics and design techniques

of VLSI systems. Students are required to complete the design of a digital subsystem in NMOS. Prerequisite: Electrical Engineering 157 or 216 or consent of instructor. Spring. 3 units. *Carroll*

211. Quantum Mechanics. Wave mechanics and elementary applications, free particle motion, Schrödinger equation, approximation methods. Fall. 3 units. *Staff*

213. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. 3 units. *Hacker or staff*

214. Introduction to Solid-State Physics. Discussion of solid-state phenomena including crystalline structures, thermal properties, free electron theory of metals, and band theory of semiconductors. Emphasis on understanding the electrical, magnetic, and optical properties of solids. Prerequisite: Physics 161 or equivalent. C-L: Physics 214. 3 units. *Hacker or staff*

215. Semiconductor Physics. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include: band theory and conduction phenomena; equilibrium and nonequilibrium charge carrier distributions; charge generation, injection, and recombination; drift and diffusion processes. Prerequisite: Electrical Engineering 211 or consent of instructor. 3 units. *Hacker or Casey*

216. Devices and Processing for Integrated Circuits. Basic operating concepts of the devices that are used in integrated circuits: Schottky-barriers, ohmic contacts, p-n junctions, bipolar transistors, and Si MOS capacitors and field-effect transistors. Device fabrication and processing will also be presented. Selected laboratory work. Fall. 3 units. *Casey*

218. Integrated Circuit Engineering. Basic processing techniques and layout technology for integrated circuits. Photolithography, diffusion, oxidation, ion implantation, and metallization. Design, fabrication, and testing of integrated circuits. Prerequisite: Electrical Engineering 216. 4 units. *Casey or staff*

219. Digital Integrated Circuits. Analysis and design of digital integrated circuits. MOSFET and bipolar devices. SPICE models. Major logic families such as NMOS, CMOS, TTL, ECL, and I²L as well as regenerative logic circuits and memories. Circuit design considerations for LSI and VLSI. Selected laboratory exercises. Prerequisites: Electrical Engineering 157 and 216. 3 units. *Massoud*

220. Integrated Circuit Fabrication Laboratory. An introduction to IC fabrication processes. Emphasis will be on Si wafer cleaning, lithography, chemical etching, thermal oxidation, diffusion, and metallization (sputtering). Laboratory fabrication and characterization of basic IC elements (pn junctions, MOS capacitors, BJTs, and MOSFETs) and simple MOS and bipolar ICs (inverters and gates). Prerequisites: Electrical Engineering 216 and 218 or consent of instructor. *Massoud*

224. Advanced Electronic Circuits. Application of discrete and integrated circuits in analog systems. A study of differential, operational, and other multistage amplifiers; frequency response, feedback, compensation techniques, and other topics. Some laboratory and computer simulation work. Prerequisite: Electrical Engineering 161 or equivalent. 3 units. *George*

234. Power Electronics: High-Power Circuits. Basic principles of analysis and design of electronic power control and conversion circuits with particular emphasis on thyristor (SCRs, TRIACs, etc.) circuits. Characteristics of high-power semiconductors, commutating circuits, AC voltage controllers, AC-to-AC controlled rectifiers, DC-to-DC converters, DC-to-AC inverters, AC-to-AC converters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *Owen and T. G. Wilson*

235. Nonlinear Magnetic and Semiconductor Power Converters. Nonlinear magnetic and semiconductor switching characteristics for transient and steady-state analysis of power electronic circuits. Design of saturable and nonsaturating magnetic devices. State-plane analysis of negative-resistance oscillators and self-oscillating inverters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *Owen and T.G. Wilson*

236. Energy-Storage Power Converters. Analysis and design of switch-mode electronic power converters utilizing energy-storage principles. Determination of large-signal and small-signal dynamic response and stability of closed-loop regulated converters. Extensive use of computer-aided analysis, design and measurement techniques. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *Owen and T.G. Wilson*

241. Linear Systems. Modeling of multiple input-output linear systems in the frequency and time domains. Matrix differential and difference equations and their solutions; state variables. Digital simulation of differential systems. Fourier analysis of signals and systems. Transform techniques applied to state variable models. State-space models of distributed systems. 3 units. *Kerr or Wang*

250. Introduction to Robotics. Fundamental notions in robotics, basic configurations of manipulator arm designs, coordinate transformations, control of robot actions, robot programming, artificial intelligence; machine vision, force, touch, and other sensory systems; selected laboratory assignments. Prerequisites: Electrical Engineering 112 and consent of instructor. 3 units. *Wang*

251. Pattern Classification and Recognition. Parameter estimation and supervised learning; nonparametric techniques; linear discriminant functions; clustering; language theory related to pattern recognition; examples from areas such as character and severe weather recognition, classification of community health data, recognition of geometrical configurations, algorithms for recognizing low resolution touch-sensor array signatures and 3-D objects. Prerequisite: consent of instructor. 3 units. *Wang*

252. Computer Systems Organization. C-L: Computer Science 252. 3 units. *Trivedi*

253. Industrial Robotics. Introduction to robots and robotic devices. Robot performance characteristics, classical tasks, programmability and adaptability. Machine sensing, measures of effectiveness and multilevel impace matrix. Flexible manufacturing systems and hierarchies, applications. Laboratory sessions and plant tours are an integral part of the course. 3 units. *Rebman*

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Prerequisites: approval of Director of Graduate Studies and instructor. 1 to 4 units. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, and force and energy relations. Three class sessions. Prerequisite: consent of instructor. 3 units. *Joines or Hacker*

273. Waves and Fields in Optoelectronics. Mathematical methods, physical ideas, and device concepts of optoelectronics. Maxwell's equations, and definitions of energy density and power flow. Transmission and reflection of plane waves at interfaces. Optical resonators, waveguides, fibers, and detectors are also presented. Prerequisite: Electrical Engineering 143 or equivalent. 3 units. *Joines*

308. Advanced Topics in Digital Systems. A selection of advanced topics of current research interest to the instructor and the class from the areas of digital

computer architectures and fault-tolerant computer design. C-L: Computer Science 308. 3 units. *Marinos*

310. CMOS VLSI Design. A second course in VLSI, aimed at the design of VLSI systems in CMOS. The main thrusts of the course will be (1) to provide enough background in the theory of CMOS circuits to understand circuit level trade-offs; (2) to introduce a symbolic design system and its supporting software, which greatly aid the design process; (3) to examine sample chip designs with an eye to understanding competitive design methodologies. Students will complete a CMOS-oriented project comprising the design and implementation of either a hardware or a software subsystem. Prerequisite: Electrical Engineering 210 or equivalent. C-L: Computer Science 310. 3 units. *Staff*

316. Advanced Physics of Semiconductor Devices. Semiconductor materials; physics of MOS, bipolar and special devices. Silicon technology and device scaling. High frequency devices, semiconductor lasers and opto-electronics. Transducers and a brief introduction to superconducting devices if time permits. Prerequisite: Electrical Engineering 216. 3 units. *Reynolds*

399. Special Readings in Electrical Engineering. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 4 units. *Graduate staff*

COURSES CURRENTLY UNSCHEDULED

217. Lasers

222. Nonlinear Analysis

226. Modeling/Computer-Aided Analysis of Electronic Systems

227. Network Synthesis

243. Advanced Linear Systems Theory

272. Electromagnetic Communication Systems

302. Applied Information Theory and Statistical Estimation

305. Advanced Topics in Signal Processing

317. Quantum Electronics

324. Nonlinear Oscillations in Physical Systems

342. Optimal Control Theory

371. Advanced Electromagnetic Theory

373. Selected Topics in Field Theory

MECHANICAL ENGINEERING AND MATERIALS SCIENCE

Professor Chaddock, *Chairman* (142A Engineering); Professor Harman, *Director of Graduate Studies* (145 Engineering); Professors Bejan, Cocks, Dowell, Garg, Gosele, Pearsall, and Shepard; Associate Professors Loendorf, Quinlan, Shaughnessy, and D. Wright; Assistant Professors Buzzard and Pouagare; Adjunct Associate Professor Sud; Research Professor Jones

The department offers programs of study and research leading to the M.S. and Ph.D. degrees in both Mechanical Engineering and Materials Science. Current research areas available include: Heat transfer in free convection and in porous media, two-phase transport processes, cooling of electronic equipment, thermal performance of buildings, power generation, thermal design by entropy minimization, solar energy

utilization, environmental turbulence and laser-Doppler anemometry, electrohydrodynamics, aeroelasticity, chaotic motion, vibrations and acoustics of dynamic structures, nonlinear control systems, robotics, computer-aided design, finite element techniques, expert systems, failure analysis and prevention, positron annihilation spectroscopy, safe product design and product liability, polymer science, point defects and diffusion in semiconductors, electron energy transfer in solids and liquids, eco-dynamic systems engineering, thermokinetics and thermochemical control of biological processes, and applications of system dynamics to technology assessment.

202. Engineering Thermodynamics. General thermodynamic relationships and continuum properties of real substances. Availability and second law analysis of energy conversion processes. Low temperatures and the third law of thermodynamics. Reaction and multiphase equilibrium. Statistical thermodynamics of simple systems. 3 units. *Harman*

205. Biochemical Engineering. Mathematical analysis of the effects of substrate concentration, pH, temperature, and chemical inhibitors on the rate and yield of biological processes. Enzyme kinetics. Kinetics of cell growth and metabolite production in batch and continuous culture. Design of bioreactors for microbial, mammalian, and plant cell culture. Prerequisites: calculus and a course in microbial physiology or biochemistry. 3 units. *Quinlan*

206. Optimization of Bioprocess Kinetics. Concepts and mathematical modeling techniques needed to maximize the rates and yields at which cells produce biomass and metabolites. Prerequisite: Mechanical Engineering 205. 3 units. *Quinlan*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering, dealing specifically with the structure and properties of polymers. Particular attention is paid to recent developments in the processing and use of modern plastics and fibers. Product design is considered in terms of polymer structures, processing techniques, and properties. 3 units. *Clark or Pearsall*

213. Advanced Materials Science. An in-depth study of current problems in materials applications conducted in a seminar format. Treatment will include thermal, electrical, optical, and magnetic properties of materials in terms of basic physical concepts. Subjects intended to provide materials scientists and engineers with a theoretical basis for understanding and manipulating properties. Prerequisites: Engineering 83 and Mechanical Engineering 111 or 112. 3 units. *Cocks or Shepard*

214. Corrosion and Corrosion Control. Effects of environments on the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. Prerequisite: Engineering 83. 3 units. *Cocks or Jones*

215. Biomedical Materials and Artificial Organs. C-L: Biomedical Engineering 215. 3 units. *Clark*

216. Materials Science and Solar Technology. All aspects of materials science as related to solar energy development. Emphasis is placed on photovoltaic materials and devices, including the relationship of conversion efficiency to material properties and solar cell design. 3 units. *Cocks*

217. Fracture of Engineering Materials. Conventional design concepts and their relationship to the occurrence of fracture. Linear elastic and general yield fracture mechanics. Microscopic plastic deformation and crack propagation. The relationship between macroscopic and microscopic aspects of fracture. Time dependent fracture. Fracture of specific materials. Prerequisites: Engineering 83 and Mechanical Engineering 115. 3 units. *Jones*

218. Thermodynamics and Thermokinetics of Materials. Thermodynamic and thermokinetic fundamentals and their application to materials problems such as alloying, solid solution formation, and mass transport. Topics covered include the laws of thermodynamics, reactions and reaction rates, Gibbs and Helmholtz free energy, chemical potential, phase equilibria in semiconductor and metallic systems, behavior of solutions, phase diagrams, activation energies, and the transport equations. 3 units. *Cocks, Jones, Pearsall, or Shepard*

219. Applied Surface Science: Crystal Growth and Analytical Techniques. Fundamentals of surfaces processes and particle-surface interactions. Topics covered include adsorption, accommodation, elemental sticking coefficients, adatom diffusion, nucleation, thin film vapor phase growth (MBE, CVD, sputtering, etc.), and surface spectroscopies (AES, XPS, RBS, SIMS, etc.). 3 units. *Staff*

221. Compressible Fluid Flow. Basic concepts of the flow of gases from the subsonic to the hypersonic regime. Effects of friction, heat transfer, and shock on one-dimensional inviscid flow. Potential theory, oblique shock waves, and special calculation techniques in two-dimensional flow. 3 units. *Buzzard, Harman, or Shaughnessy*

222. Heat Transfer. Analytical and numerical treatment of conduction heat transfer. Boundary layer treatment of convection heat transfer. Boiling and condensing heat transfer. Gas radiation. Selected engineering applications. Prerequisite: Mechanical Engineering 150. 3 units. *Buzzard or Chaddock*

224. An Introduction to Turbulence. Flow instability and the transition to turbulence. Physical characteristics of turbulent flows, averaging, and the Reynolds equation. Turbulent transport and mixing length theories. The statistical description of turbulence, correlations, and spectra. Fourier transforms. Measurement techniques. 3 units. *Shaughnessy*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. 3 units. *Shaughnessy*

227. Advanced Fluid Mechanics. Flow of a uniform incompressible viscous fluid. Exact solutions to the Navier-Stokes equation. Similarity methods. Irrotational flow theory and its applications. Elements of boundary layer theory. Prerequisite: Mechanical Engineering 226 or consent of instructor. 3 units. *Shaughnessy*

230. Modern Control and Dynamic Systems. Dynamic modeling of complex linear and nonlinear physical systems involving the storage and transfer of matter and energy. Unified treatment of active and passive mechanical, electrical, and fluid systems. State-space formulation of physical systems. Time and frequency-domain representation. Controllability and observability concepts. System response using analytical and computational techniques. Lyapunov method for system stability. Modification of system characteristics using feedback control and compensation. Emphasis on application of techniques to physical systems. 3 units. *Garg or Wright*

234. Advanced Computer-Aided Engineering. Advanced concepts and practices of computer-aided engineering (CAE), which includes computer-aided design and computer-aided manufacturing (CAD/CAM). Emphasis on computer graphics, engineering data management, interactive programming, and integrated analysis/design. Students will develop interactive programs that integrate the above areas. Prerequisite: programming capability in FORTRAN. 3 units. *Loendorf*

235. Advanced Mechanical Vibrations. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques, transfer matrices applied to lumped and distributed systems, analytical and numerical methods of obtaining the pulse response of plane and three-dimensional multi-mass systems, convolution and data processing, introduction to random vibration. 3 units. *Staff*

236. Engineering Acoustics and Noise Control. Specification of the physical properties of noise; noise measurement; and absorption, transmission, and propagation of sound. Effects of noise on humans, noise exposure, and damage risk criteria. Legal aspects of noise control, source modification, enclosures, barriers, and personnel protectors. Prerequisites: Mechanical Engineering 123 and Mathematics 111. 3 units. *Wright*

240. Patent Technology and Law for Engineers. The use of patents as a technological data base is emphasized including information retrieval in selected engineering disciplines. Fundamentals of patent law and patent office procedures. 3 units. *Cocks*

241. Advanced Mechanical Design. A study of those processes in mechanical design which occur after a prototype has been developed. Areas of study may include prototype testing and evaluation, computer analysis, marketing, CAD, redesign, detail drafting, manufacturing processes for mass production, economic analysis, patents, and entrepreneurial activities. Semester projects using design teams will be used to study these areas. Prerequisite: Mechanical Engineering 141. 3 units. *Staff*

242. Data Base Methodology. C-L: Computer Science 241. 3 units. *Starmer*

254. Solar Energy Thermal Processes. Solar radiation instrumentation, measurements, data, and estimation. Radiation heat transfer characteristics of opaque materials and partially transparent media. Performance and design calculations for flatplate and focusing collectors. Thermal energy storage. Solar water heating and heating and cooling of buildings. Economics and life cycle costing studies for solar installations. Survey of research, development, and demonstration projects on solar thermal processes. 3 units. *Chaddock*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. Prerequisites: approval of Director of Undergraduate or Graduate Studies and instructor. 1 to 3 units. *Staff*

277. Optimization Methods for Mechanical Design. Definition of optimal design. Methodology of constructing quantitative mathematical models. Nonlinear programming methods for finding "best" combination of design variables: minimizing steps, gradient methods, flexible tolerance techniques for unconstrained and constrained problems. Emphasis on computer applications and term projects. Prerequisite: consent of instructor. 3 units. *Wright*

302. Advanced Thermodynamics. Classical thermodynamics of inherently irreversible processes. Quantum and statistical thermodynamic analysis of properties of real substances and processes. Principles of general thermodynamics. 3 units. *Harman*

323. Convective Heat Transfer. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow,

nucleation, boiling, and condensation heat and mass transfer. Prerequisite: Mathematics 285. 3 units. *Chaddock*

324. Conduction and Radiation Heat Transfer. Conduction heat transfer in steady and transient state. Radiation exchange involving absorbing and emitting media including gases and flames, combined conduction and radiation, and combined convection and radiation. Exact and approximate methods of solution including separation of variables, transform calculus, numerical procedures, and integral and variational methods. Prerequisites: Mathematics 230 and Mechanical Engineering 222 or equivalent. 3 units. *Buzzard*

331. Nonlinear Control Systems. Analytical, computational, and graphical techniques for solution of nonlinear systems; Krylov and Bogoliubov asymptotic method; describing function techniques for analysis and design; Liapounov functions and Lure's methods for stability analysis; Aizerman and Kalman conjectures; Popov, circle, and other frequency-domain stability criteria for analysis and synthesis. Prerequisite: Mechanical Engineering 230 or consent of instructor. 3 units. *Garg or Wright*

399. Special Readings in Mechanical Engineering. Individual readings in advanced study and research areas of mechanical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

210. Intermediate Dynamics

223. Principles and Design of Heat Transfer Equipment

231. Systems Response and Control

232. Nonlinear Analysis

267. Energy Use in Educational Facilities

280. Nuclear Reactor Power Cycles

300. Advanced Projects in Mechanical Engineering

311. Behavior of Crystalline Solids

321. Gas Dynamics

322. Mechanics of Viscous Fluids

327. Homogeneous Turbulence

328. Turbulent Shear Flow

333. Seminar in Control Systems

335. Analytical Methods in Vibrations

372. Finite Element Techniques in Design

English

Professor G. Williams, *Chairman* (323 Allen); Professor Anderson, *Director of Graduate Studies* (316 Allen); Professors Budd, Cady, Duffey, Ferguson, Gleckner, Jackson, Lentricchia, Monsman, Nygard, Randall, Ryals, Smith, Strandberg, and K. Williams; Associate Professors Butters, DeNeef, Gerber, Jones, and Mellown; Assistant Professors Porter and Torgovnick; Visiting Professor Robertson

The department offers graduate work leading to the A.M. and Ph.D. degrees. A statement of the requirements for the A.M. and Ph.D. degrees may be obtained from

the Director of Graduate Studies. The department requires a reading knowledge of one foreign language for the A.M. degree; for the Ph.D. degree, two languages determined by the student's committee.

For Seniors and Graduates

208. History of the English Language. Introductory survey of the changes in sounds, forms, and vocabulary of the English language from its beginning to the present, with emphasis on the evolution of the language as a medium of literary expression. C-L: Medieval and Renaissance Studies. 3 units. *Nygard*

209. Present-Day English. A survey of contemporary linguistic theories applied to modern English; designed for students of literature and teachers of English. 3 units. *Butters or Nygard*

212. Middle English Literature: 1100 to 1500. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *Nygard or Robertson*

221. Renaissance Prose and Poetry: 1500 to 1660. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef, Randall, or G. Williams*

225. Renaissance Drama: 1500 to 1642. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *Randall or G. Williams*

235. Restoration and Eighteenth-Century Literature: 1660 to 1800. Selected topics. 3 units. *Ferguson or Jackson*

241. Romantic Literature: 1790 to 1830. Selected topics. 3 units. *Gleckner, Jackson, or Monsman*

245. Victorian Literature: 1830 to 1900. Selected topics. 3 units. *Monsman or Ryals*

251. British Literature since 1900. Selected topics. 3 units. *Mellown or Smith*

263. American Literature to 1865. Selected topics. 3 units. *Anderson or Jones*

267. American Literature: 1865 to 1915. Selected topics. 3 units. *Budd, Cady, or K. Williams*

275. American Literature since 1915. Selected topics. 3 units. *Duffey, Lentricchia, or Strandberg*

287. Major Critical Thought. A study of major figures in the history of literary criticism. 3 units. *Duffey*

For Graduates

312. Studies in Middle English Literature. C-L: Medieval and Renaissance Studies. 3 units. *Nygard or Robertson*

315. Studies in Chaucer. C-L: Medieval and Renaissance Studies. 3 units. *Nygard or Robertson*

321. Studies in Renaissance Literature. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef, Randall, or G. Williams*

324. Studies in Shakespeare. C-L: Medieval and Renaissance Studies. 3 units. *G. Williams or Porter*

329. Studies in Milton. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef*

337. Studies in Augustanism. 3 units. *Ferguson or Jackson*

338. Studies in a Major Augustan Author. 3 units. *Ferguson, Gleckner, or Jackson*

- 341. Studies in Romanticism.** 3 units. *Gleckner, Jackson, or Monsman*
- 347. Studies in Victorianism.** 3 units. *Monsman or Ryals*
- 348. Studies in a Major Nineteenth-Century Author.** 3 units. *Gleckner, Jackson, Monsman, or Ryals*
- 353. Studies in Modern British Literature.** 3 units. *Mellown or Smith*
- 361. Studies in American Literature before 1915.** 3 units. *Anderson, Budd, Cady, Jones, or K. Williams*
- 368. Studies in a Major American Author before 1915.** 3 units. *Anderson, Budd, Cady, Jones, or K. Williams*
- 375. Studies in Modern American Literature.** 3 units. *Duffey, Lentricchia, or Strandberg*
- 376. Studies in a Modern Author (British or American).** 3 units. *Duffey, Lentricchia, Mellown, Smith, or Strandberg*
- 381. Special Topics Seminar.** 3 units. *Staff*
- 383. Studies in Textual Criticism.** C-L: Medieval and Renaissance Studies. 3 units. *G. Williams*
- 385. Studies in Literary Criticism.** 3 units. *Staff*
- 390. Seminar in the Teaching of Composition.** Required of newly appointed tutors in English during their first semester of teaching at Duke; admission also by consent of instructor. 3 units, ungraded. *Staff*
- 391. Tutorial in Special Topics.** 3 units. *Staff*
- 392. Tutorial in Journal Editing.** Systematic exposure to all phases of academic journal editing. Permission of instructor required. C-L: History 392. 3 units, ungraded. *Ferguson or Watson (history)*

COURSES CURRENTLY UNSCHEDULED

- 310. Studies in Old English Literature**
- 380. Studies in Ballad and Folksong**

TUTORIALS

Specialized subjects of study will be offered, numbered in the 390s, to accommodate the interests of advanced graduate students. Tutorials will be offered to single students or to small groups. Instruction will be conducted in weekly sessions, or in more frequently scheduled sessions, if the instructor wishes. Emphasis will be on independent reading and investigation, and oral and written reports. A substantial amount of writing will be required.

Students are advised to consult the Director of Graduate Studies for a list of tutorials currently scheduled to be offered. 3 units. *Staff*

Forestry and Environmental Studies

Professor Jayne, *Dean* (216 Biological Sciences); Professor Stambaugh, *Director of Graduate Studies* (011 Biological Sciences); Professors Knoerr and Yoho; Associate Professors Christensen, Hyde, and Richardson; Assistant Professors Binkley, Davis, Di Giulio, Maguire, Marin, Reckhow, and Royer; Professors Emeriti Anderson, Hellmers, and Philpott; Adjunct Professors Boyce, Condrell, Hart, Heath, and Sizemore; Adjunct Associate Professor Dutrow; Adjunct Assistant Professor Vasievich

Major and minor work is offered in the areas of natural resource science/ecology, natural resource systems science, and natural resource economics/policy. Programs of study and research lead to the A.M., M.S., and Ph.D. degrees. College graduates who have a bachelor's degree in one of the natural or social sciences, forestry, engineering, business, or environmental science will be considered for admission to a degree program. Students will be restricted to the particular fields of specialization for which they are qualified academically. Graduate School programs usually concentrate on some area of natural resource science/ecology, systems science, or economics/policy, while study in resource management is more commonly followed in one of the professional master's degree programs of the School of Forestry and Environmental Studies. For more complete program descriptions and information on professional training in forestry or environmental studies, the *Bulletin of Duke University: School of Forestry and Environmental Studies* should be consulted.

The specific degrees available in forestry and related natural resources through the Graduate School are: the A.M. (with or without a thesis), M.S. (with a thesis), and the Ph.D. Students majoring in forestry or environmental studies may be required to demonstrate satisfactory knowledge of one or two foreign languages for the Ph.D. degree. More information on degree and language requirements can be found in the program information section of the bulletin.

200. Student Projects. Prerequisite: consent of the dean of the School of Forestry and Environmental Studies. Units to be arranged. *Staff*

201. Field Studies. Units to be arranged. *Staff*

204. Forest Inventory, Growth, and Yield. Measurement of land and forests for purposes of management, appraisal, purchase, and sale. Techniques for predicting the growth and future yield of stands by various methods. 3 units. Fall. *Staff*

205. Silviculture. Consideration of the decision-making processes by which prescriptions are formulated for regeneration, tending, and harvesting of forest stands. Biological factors underlying stand manipulation are stressed and economic, harvesting, and utilization variables are discussed as appropriate. Emphasis on principles and techniques that transcend vegetational types or geographic regions. Spring. 4 units. *Staff*

207. Forest Pest Management. Fundamentals of entomology and plant pathology as appropriate to understanding the impacts of insects and diseases on forest productivity and their assessment for integration into forest management. Regional case examples and complexes are evaluated in terms of pest-population, forest-stand dynamics; economic and societal constraints; treatment strategies; monitoring systems; and benefit-cost analysis. This approach seeks to develop predictive capabilities in long-range pest management and decision making. Laboratory is largely field oriented to focus on diagnostics and impact analysis. Fall. 3 units. *Stambaugh*

208. Fire Behavior and Use. Impacts of destructive agents upon forests; principles of combustion, fire behavior, danger measurement, and suppression; use of fire in forest management. Spring. 3 units. *Staff*

210L. Forest Pathology. Diseases of North American forests and their timbers, with emphasis on current literature and management strategies. Field and laboratory diagnosis. Spring, even-numbered years. 3 units; 4 units with laboratory. *Stambaugh*

211L. Applied Ecology and Ecosystem Management. An application of ecological principles to applied resource and environmental problems with an emphasis on the ecosystem as a basic working unit. Perspectives include such topics as land/water interactions, the patchiness concept, succession, energy flow, productivity, mineral cycling, perturbation effects on ecosystems, and limiting factors. Laboratory studies

will focus on the team approach to analyzing the biotic and abiotic components of the ecosystem and impact analysis. Fall. 4 units. *Richardson*

212. Ecosystem Dynamics in Forest Productivity. Information about forest ecosystems is quantitatively integrated with silviculture to form a decision and control process for producing biologically possible combinations of benefits. Timber, cash flow, wildlife habitats, streamflow, recreation opportunities, and other benefits are assessed singly and in combinations. Principles of cybernetics and system dynamics are used. Fall. 3 units. *Boyce*

213. Forest Ecosystems. Introduction to the environmental and biotic processes and integration of these processes into ecosystem patterns. Extensive use is made of case studies and microcomputer simulation models to illustrate dynamic interactions of ecosystem processes. Elective laboratory, taught as Forestry and Environmental Studies 214, introduces field aspects of forest ecology. Fall. 3 units. *Binkley*

215. Environmental Physiology. Examination of the concepts of tolerance, limiting factors, bioenergetics, nutrition, stress physiology, homeostasis, and alleopathy for both plant and animal life. Discussion of procedures for and examples of monitoring physiological perturbations due to resource manipulation. Spring, even-numbered years. 2 units. *Richardson and Di Giulio*

216. Applied Population Ecology. Discussion of population dynamics of natural and exploited populations. A quantitative approach with an emphasis on mathematical models and their application to population problems. Spring, even-numbered years. 2 units. *Staff*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. Offered at the Duke Marine Laboratory, Beaufort, North Carolina. Summer. C-L: Botany 218 and Marine Sciences 218. 6 units. *Godfrey*

221L. Forest Soils. Introduction to soil resources and the interactions of forest production, management, and soil fertility. Topics include soil chemistry, physics, development, and nutrient cycling, all from the perspective of maintaining and improving forest productivity. Spring. 3 units. *Binkley*

230. Weather and Climate. 4 units. *Knoerr*

231. Environmental Climatology. Applications of climatology to solving problems in ecology and natural resource management. History of the atmosphere and world climates is considered to provide a perspective on current conditions. Impact of weather on human behavior and natural resource management. Spring. 3 units. *Staff*

232. Microclimatology. C-L: Botany 232. 3 units. *Knoerr*

234. Watershed Hydrology. Introduction to the hydrologic cycle with emphasis on the influence of land use, vegetation, soil types, climate, and land forms on water quantity and quality and methods for control. Development of water balance models. Analysis of precipitation patterns, rainfall and runoff, and nonpoint source impacts. Statistical handling and preparation of hydrologic data, simulation and prediction models, introduction to groundwater flow, laboratory and field sampling methods. Fall. 3 units. *Marin*

236. Water Quality Management. 4 units. *Reckhow*

237. Watershed Modeling and Management. Analysis of models for individual hydrologic processes. Evaluation of management-oriented watershed models based

on the hydrologic process models. Simulations with watershed models as a basis for management decision making to optimize water yield quantity, timing, or quality under various vegetative, climatic, topographic, and soil conditions. Prerequisite: Forestry and Environmental Studies 234. Spring. 3 units. *Knoerr and Marin*

251. Natural Resource Data Analysis. Elements of statistical inference and estimation including exploratory data analysis, regression, analysis of variance. Fall. 3 units. *Wilkinson*

252. Computer Applications in Forestry. Overview of the applications of computer technology to problems in forest management. Review of hardware and software capabilities; procedures for planning and implementation, practical applications in forestry operations. Spring. 1 unit, intensive. *Vasievich*

261. Remote Sensing for Resource Management. An examination of remote sensing systems as sources of information in resource management with an emphasis on aerial photography and multispectral scanners. Emphasis on the interpretation of airborne and space imagery. Spring. 3 units. *Davison*

262. Forest Utilization. Introduction to utilization in the managed forest and the principal wood-using industries. Taught as a one-week field seminar. May be taken by nonforestry majors. Spring. 1 unit, intensive. *Staff*

263. Harvesting and Transportation Systems. Analysis of cable, tractor, and aerial harvesting systems. Sawlog and pulpwood transportation. Emphasis on material flow, inventory control. Application of simulation and optimization methods to harvesting, loading, and transport. Spring. 3 units. *Jayne*

264. Manufacturing Systems. Study of material processing in sawmills, pulp-mills, plywood plants, and composite board manufacturing facilities. Emphasis on material flow, quality control, inventory control. Application of quantitative methods and economic analysis to forest product manufacturing operations. Fall. 3 units. *Jayne*

266. Ecology of Southern Appalachian Forests. One-week introduction to forest ecosystems in the southern Appalachians, including species identification, major forest types, patterns in ecosystem distributions, and effects of human activities. 1 unit, intensive. *Binkley*

267. Wildland and Wildlife Management. Overview of wildlife management in relation to land use, properties of wildlife populations, elements of game range, manipulation of food and cover, agencies involved in wildlife conservation, and the role of public and political involvement. Spring. 3 units. *Staff*

270. Resource Economics and Policy. C-L: Public Policy Studies 272. Spring. 4 units. *Hyde*

283. Environmental Policy and Values. Prerequisite: consent of instructor. Fall. 3 units. *Royer*

299. Independent Projects. Directed readings or research at the graduate level to meet the needs of individual students. Units to be arranged. *Staff*

301. Forest Nutrition Management. Basic processes of soil chemistry and ecosystem nutrient cycling as regulators of forest production. Management impacts such as fertilization, fire, harvest, and biological nitrogen fixation. Laboratories include methods of determining site fertility, assessing forest productivity, and using computer simulation models to guide management decisions in forest nutrition programs. Spring. 4 units. *Binkley*

302. Models in Forest Productivity. An overview of models used in forest productivity management and research, ranging from stand growth and yield to forest

ecosystem models. Students learn how to choose appropriate models for management and research, use them and analyze the results, evaluate their validity and utility, and interpret models used by others. 3 units. *Staff*

304. Forest Yield. Productivity of forest trees and stands, particularly as a function of silvicultural manipulation; analysis of stand responses such as growth rate, stem form, tree quality, product quality and value. One or more growth models are assessed for biological reality and usefulness to forest managers. Prerequisite: Forestry and Environmental Studies 205. Spring, even-numbered years. 2 units. *Staff*

305. Harvesting Effects on Productivity. Impacts of harvesting on the residual stand, soil properties, water quality, and future site productivity. The integration of harvesting into overall stand management through a full rotation is stressed. Half course (first half) Fall. 2 units. *Staff*

306. Choices in Silviculture. Quantitative methods are used to evaluate silvicultural options for producing flows of timber, cash, water, wildlife habitats, and other benefits. Information for forestry is translated into quantitative terms and analyzed with systems dynamics techniques. Applications for increasing the production of forests within biophysical and economic constraints. Fall. 1 unit, intensive. *Boyce*

308. Tree Biology. Life processes and properties of trees, including anatomy, physiology, and chemistry. Focuses on the tree as an integrator of ecological site factors in the production of value from the forest. Spring. 2 units. *Staff*

309. Forest Regeneration. Natural and artificial means of creating new forest stands of desirable quality and stocking. Biological, economic, and technical factors are considered. Prerequisite: Forestry and Environmental Sciences 205. Fall. 2 units. *Staff*

311. Ecological Toxicology. Study of environmental contaminants from a broad perspective encompassing biochemical, ecological, and toxicological principles and methodologies. Emphasis on sources, environmental transport and transformation phenomena, accumulation in biota and ecosystems, and impacts at various levels of organization. Prerequisites: general ecology and vertebrate physiology or consent of instructor. Fall. 3 units. *Di Giulio*

312. Wetlands Ecology. The study of bogs, fens, marshes, and swamps. Emphasis on processes within the ecosystem: biogeochemical cycling, decomposition, hydrology, and primary productivity. Ecosystem structure, the response of these systems to perturbations, and management strategies are discussed. A research project is required. Prerequisites: Forestry and Environmental Sciences 211 or equivalent and consent of instructor. Spring, odd-numbered years. 3 units. *Richardson*

314. Integrated Case Studies in Toxicology. Students are assigned topics relative to their chosen research discipline in toxicology and are asked to develop case studies to present at a roundtable workshop. Emphasis on review and analysis of toxicological problems from a holistic (multidisciplinary) viewpoint. C-L: Pharmacology 314. Spring. 1 unit. *Richardson or Di Giulio*

317. Applied Ecological Problem Solving. Workshop in organizing, conducting, and presenting management-oriented ecological research. Students work in groups to collect and analyze information needed to solve a local resource management problem. Goal setting, network analysis, decision analysis, statistics, and simulation are used. Prerequisite: coursework or experience in ecology, statistics, computer programming, and simulation, or consent of instructor. Spring. 4 units. *Maguire*

318. Seminar in Ecotoxicology. Discussion of current topics concerning environmental contaminants. Individual students review a chosen topic and lead subsequent discussion. Guest speakers. Spring. 1 unit. *Richardson and Di Giulio*

319. Seminar in Natural Resource Ecology. Discussion of current ecological and environmental problems and research topics related to the management of natural resources. Spring. 1 unit. *Staff*

320. Seminar in Integrated Case Studies in Natural Resource Analysis. Examination and analysis of the integrated case study for solving resource and environmental problems. Prerequisite: consent of instructor. Offered on demand. 2 units. *Richardson*

322. Microbiology of Forest Soils. Ecology of the microbial populations of forest soils, with emphasis on rhizosphere interactions, root pathogenesis, and mycorrhizae. Prerequisite: consent of instructor; mycology and bacteriology are recommended. Spring, odd-numbered years. 4 units. *Stambaugh*

330L. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air resources. Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Includes laboratory. C-L: Botany 330L. Spring. 4 units. *Knoerr*

331. Water Resource Systems. Introduction to the fundamentals of water resource systems planning and management. Emphasis on optimization, simulation, statistical and economic principles for management of surface and subsurface water resources. Topics include project selection and evaluation, design of standards and regulations, stochastic and deterministic quantity/quality simulation models, water supply and wastewater treatment technologies, decision and risk analysis. Spring. 3 units. *Marin*

332. Air Quality Management and Modeling. Types and sources of atmospheric contaminants including effects of industry, urban development, farming and forestry practices, and recreation. Meteorological effects on air quality. Determination of air quality trends and the application of management systems from a meteorological point of view. Types and applications of air quality models. Performance of air quality models under various emission sources, meteorological, and topographic conditions. Fall. 3 units. *Staff*

339. Seminar in Water Quality Modeling. Study of existing water quality simulation models using sensitivity analysis and experimental design. Spring, odd-numbered years. 1 unit. *Reckhow*

350. Statistical Estimation and Inference for Resource Management. Regression analysis with nonexperimental data, simultaneous equations, time series analysis using Box-Jenkins methods. Emphasis on natural resource management applications and inferences for policy evaluation and planning. Includes laboratory. Spring. 4 units. *Reckhow*

352. Matrix Methods for Resource Systems. The algebra of matrices: addition, subtraction, multiplication, and matrix inversion. Solution of simultaneous equations. Partitioning, transformations, eigenvectors, and eigenvalues. Application to diffusion processes, statistical methods, and population dynamics. Given in first half of semester. Spring. 2 units. *Jayne*

353. Analysis of Resource Systems. Introductory survey of linear and nonlinear difference and differential equations important in resource management and environmental decision making. Graphical, analytic, and numerical methods of solution, determination of equilibrium and stability, oscillatory and chaotic systems, boundary value problems. Prerequisite: consent of instructor. Spring. 3 units. *Staff*

355. Optimization Methods for Resource Management. Introductory survey of optimization techniques useful in resource management and environmental decision

making. Numerical techniques for unconstrained optimization, linear programming, dynamic programming, and optimal control methods. Prerequisite: consent of instructor. Fall. 3 units. *Staff*

361. Forest Resource Management. Principles of organizing forest properties for systematic management; use of data obtained in surveys and inventories; principles of forest regulation, including a study of normal and actual forests, rotations, cutting cycles, and methods of regulating the cut in even-aged and all-aged forests for sustained yield; introduction to the preparation of preliminary forest management plans. Spring. 3 units. *Staff*

367. Seminar in Forest Resource Management. Examination and analysis of techniques employed in the management of industrial and public forests, particularly in the South; discussion of problems of large-scale intensive forest management. Prerequisites: Forestry and Environmental Studies 205 and 361 or equivalents. Fall, spring. 1 unit. *Staff*

372, 373. Advanced Natural Resource Economics. Survey of advanced topics in natural resource and environmental economics. Emphasis on renewable resources and public policy. Prerequisite: consent of instructor. Fall and spring. 3 units each. *Hyde*

377. Seminar in Natural Resource Allocation and Efficiency. Evaluation of economic principles concerned with problems of natural resource allocation, with special attention to the alternatives for governmental policies in private property economics. Prerequisite: consent of instructor. Fall, even-numbered years. 1 unit. *Staff*

381. Natural Resource Policy. An examination of institutions and processes in the public sector that influence natural resource allocation and use of the environment. Emphasis on political allocation of resources, especially legislative and administrative processes. Current natural resource and environmental policy is briefly surveyed. Prerequisite: consent of instructor. Spring. 3 units. *Royer*

384. Special Tax Problems for Industrial Timberland Owners. Current problems of industrial timber taxation including the use of subsidiaries in sales, Internal Revenue Service audits, valuation, financing of land, and casualties. Prerequisite: Forestry and Environmental Studies 288 or equivalent experience. Fall. 1 unit. *Condrell*

385. Decision Theory and Risk Analysis. Bayesian decision theory, including conditional probability, subjective probability, utility theory, value of sample information, and multiattribute problems. Behavioral decision theory. Applications of decision theory in resource and environmental policy making. Prerequisite: Forestry and Environmental Studies 251 or equivalent. Spring. 2 units. *Reckhow*

388. Seminar in Resource and Environmental Policy. Discussion of the political, legal, and socioeconomic aspects of public and private action in environmental quality control and management. Prerequisite: consent of instructor. Fall, spring. 1 unit. *Staff*

COURSES CURRENTLY UNSCHEDULED

203. Silvics

209. Forest Entomology

310. Forest Productivity and Mineral Cycling

338. Micrometeorology and Biometeorology Seminar

Genetics — The University Program

Professor Antonovics, *Director* (botany); Professors Amos (microbiology and immunology), Boynton (botany), Counce (anatomy), Gillham (zoology), Gross (biochem-

istry), Guild (biochemistry), Joklik (microbiology and immunology), Modrich (biochemistry), Moses (anatomy), Nicklas (zoology), C. Ward (zoology), F. Ward (microbiology and immunology), and Webster (biochemistry); Associate Professors Bastia (microbiology and immunology), Endow (microbiology and immunology), Greene (biochemistry), Greenleaf (biochemistry), Keene (microbiology and immunology), and Steege (biochemistry); Assistant Professors Burdett (microbiology and immunology), M. Hershfield (biochemistry), Holmes (biochemistry), Hsieh (biochemistry), Johnston (botany), Kredich (biochemistry), Schachat (anatomy), and Uyenoyama (zoology); Adjunct Professors Drake (National Institute of Environmental Health Sciences), Judd (National Institute of Environmental Health Sciences), and Lucchesi (University of North Carolina)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Department of Botany).

For Seniors and Graduates

205. Molecular Biology and Genetics. Molecular aspects of gene expression and cell differentiation; application of recombinant DNA techniques to basic and applied problems. Prerequisites: organic chemistry and cell biology or genetics. C-L: Botany 205. 3 units. *Johnston*

215. Molecular Genetics I: Genetic Mechanisms. Genetic mechanisms in molecular terms emphasizing gene function, segregation, and regulation in procaryotes and eucaryotes. Systems covered include bacterial viruses, bacteria, plasmids, cellular organelles, and selected lower and higher eucaryotes. Course material will be drawn from the original literature. Prerequisite: introductory biochemistry. C-L: Biochemistry 215. 3 units. *Gross and staff*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry and Molecular Biology I or consent of instructor. C-L: Biochemistry 268, Botany 268, and Microbiology and Immunology 268. 3 units. *Modrich and staff*

280. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisites: introductory biology and Chemistry 12 and Mathematics 31 or equivalents. C-L: Botany 280 and Zoology 280. 3 units. *Antonovics, Boynton, and Gillham*

285. Ecological Genetics. Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Botany 280 and 286 or equivalents. C-L: Botany 285S. 3 units. *Antonovics*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Complements Zoology 235. Prerequisites: college biology and Genetics 280 or equivalent. C-L: Botany 286 and Zoology 286. 3 units. *Antonovics and H. Wilbur*

288. Mathematical Population Genetics. Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating

systems, sex ratio, stochastic processes. Prerequisite: calculus; statistics and linear algebra recommended. C-L: Zoology 288. 3 units. *Uyenoyama*

For Graduates

336. Contemporary Topics in Immunogenetics. Selected themes in immunogenetics with special emphasis on molecular approaches. The major areas discussed are: the nature, interaction, and expression of immunoglobulin genes and T-cell receptor genes, the genes of the major histocompatibility complex, and the genes of the T/t complex. The central ideas discussed include the manner in which cells recognize and interact with each other in phylogeny, ontogeny, and in differentiation; how gene families evolve and interact; and how information about these complex genetic systems is used in basic research and in clinical medicine. Prerequisite: Microbiology and Immunology 244 or 291 or 330 or equivalent. C-L: Microbiology and Immunology 336. 2 units. *Amos, Ward, and staff*

350. Genetics Colloquium. Lectures, discussion sessions, and seminars on selected topics of current interest in genetics. Required of all students specializing in genetics. Prerequisites: a course in genetics and consent of instructor. 1 unit. *Counce and staff*

COURSES CURRENTLY UNSCHEDULED

283. Extrachromosomal Inheritance

Geology

Professor Perkins, *Chairman* (119 Art Museum, East); Professor Heron, *Director of Graduate Studies* (114 Art Museum, East); Professor Pilkey; Associate Professors Corliss, Johnson, and Rosendahl; Assistant Professors Baker and Bloomer; Adjunct Assistant Professor Strelitz

The Department of Geology offers graduate work leading to the M.S. and Ph.D. degrees. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, igneous and metamorphic rocks, stratigraphy or sedimentation, and structural geology. In addition, the student must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology provide specialized training in the fields of facies analysis, geological oceanography, sedimentary petrology, paleobiology, geophysics, and low-temperature geochemistry.

An acceptable thesis is required. There is no language requirement for the M.S. degree.

For Seniors and Graduates

200. Beach and Coastal Processes. The study of sediments, sedimentary processes, and geomorphology of nearshore environments. 3 units. *Pilkey*

203. Physical Oceanography. Physical processes in the oceans: the physical properties of seawater, the dynamics of currents, waves and tides, and the transmission of light and sound in the sea. Prerequisite: Physics 41 or 51. (Given at Duke Marine Lab, Beaufort.) Half course. *Johnson*

204. Chemical Oceanography. Chemical processes in the oceans: the major ion composition of sea salt, the distribution of dissolved gasses in seawater, sediment-seawater interactions, and seawater-basalt interactions at oceanic ridge crests. Prereq-

quisites: Chemistry 11 and Geology 203 (may be taken concurrently). (Given at Duke Marine Lab, Beaufort.) 3 units. *Staff*

205S. Geological Oceanography. The geology of ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. (Given at Duke Marine Lab, Beaufort.) 3 units. *Johnson*

206S. Principles of Geological Oceanography. A survey of geological aspects of the oceans including sediment types, processes of sedimentation, geologic structures of the ocean basins, and bottom physiography. Prerequisite: Geology 108 or consent of instructor. 3 units. *Pilkey*

208S. Paleoceanography. Application of stratigraphic, paleontologic, and geochemical evidence in sediments to understanding ancient oceans and climates. Prerequisite: Geology 206S or consent of instructor. 3 units. *Baker*

212. Carbonate Facies Analysis: Recent and Ancient. Origin, distribution, and diagenetic alteration of recent carbonate sediments and their ancient analogs. Prerequisite: Geology 111. 3 units. *Perkins*

214S. Sedimentary Petrography. Descriptive and interpretive analysis of sediments and sedimentary rocks in thin section, with an emphasis on diagenesis. Prerequisite: consent of instructor. 3 units. *Perkins*

215. Clastics Facies Analysis: Recent and Ancient. Modern clastic depositional systems and their ancient analogs. Prerequisite: Geology 111. 3 units. *Heron*

216. Field Analysis of South Florida Carbonates. Analysis of recent sediments and organisms and their Pleistocene analogs. One-week field trip. Prerequisite: Geology 111 or consent of instructor. 1 unit. *Perkins*

217. Field Analysis of Ancient Sedimentary Sequences. Regional analysis of ancient clastic and carbonate systems. One-week field trip. Prerequisite: Geology 111 or consent of instructor. 1 unit. *Heron or Perkins*

249. Marine Micropaleontology. Introduction to marine microfossils, basic principles of micropaleontology and stable isotope geochemistry with applications to paleoceanography. Lectures and laboratory. Prerequisite: Geology 206S or consent of instructor. 3 units. *Corliss*

251. Physics of the Earth. Origin, primeval evolution, rotation, potential fields, paleomagnetism, gravity anomalies, earthquake seismology, thermal properties, internal structure of the earth, and thermodynamics of plate motions. Prerequisites: Geology 41 and Chemistry 12 and Mathematics 32 and Physics 52 or consent of instructor. 3 units. *Rosendahl*

252. Exploration Seismology. Elastic wave theory, reflection and refraction of acoustic waves, field methodologies, computer processing, and interpretation of seismic data. Prerequisites: Geology 41 and Mathematics 32 and Computer Science 51 and Physics 52 or consent of instructor. 3 units. *Rosendahl*

255. Seismic Interpretation. Basic rock physics, seismic expression of structural styles, seismic facies analysis, maps generated from seismic data, and basin-wide seismic stratigraphic analysis. Prerequisite: Geology 251; corequisite: Geology 252 or consent of instructor. 3 units. *Rosendahl and staff*

260S. Hydrocarbon Exploration. Origin, migration, and accumulation of hydrocarbons with emphasis on exploration techniques. Prerequisites: Geology 111 and 251. 3 units. *Perkins and Rosendahl*

270. Geochemistry. Application of chemical principles to geological problems. Prerequisites: Chemistry 12 and Mathematics 32. 3 units. *Baker*

271. Low-Temperature Geochemistry. Chemistry of aqueous solutions, authigenic minerals, surfaces, and stable isotopes in sedimentary systems. Prerequisite: Geology 270 or consent of instructor. 3 units. *Baker*

281S. Igneous Petrology. Current topics in igneous petrology including andesite petrogenesis, ocean ridge basalts, and experimental petrology. Prerequisites: Geology 105 and 106. 3 units. *Bloomer*

292. Computer Methods in Geology. Techniques used in the geological sciences including simulation and forward modelling, inverse and least squares methods, statistical methods and exploratory data analysis as well as graphics. Prerequisites: Mathematics 32 and Computer Science 51, or consent of instructor. 3 units. *Strelitz*

295S. Advanced Topics in Geology. Topics, instructors, and credits to be arranged each semester. *Staff*

For Graduates

371, 372. Advanced Topics in Geology. To meet the individual needs of graduate students for independent study in various environmental sedimentary fields. 1 to 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

253S. Geophysics

254. Geophysical Field Methods

Germanic Languages and Literature

Associate Professor Borchardt, *Chairman and Director of Graduate Studies* (106 Languages); Professor Phelps; Associate Professors Alt and Rolleston; Assistant Professor Westphal-Wihl; Visiting Professor Jantz

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German as a related field should normally have completed a third-year course (in exceptional cases, a second year) of college German with acceptable grades.

For Seniors and Graduates

200S. Proseminar. Fundamental course for advanced study of German; literary history, schools of criticism, practical exercises in interpretation, and research methods. 3 units. *Borchardt or Alt*

201S, 202S. Goethe. His life and works, in the light of his lasting significance to Germany and world literature. 201S: lyrics, prose, fiction, and selected dramas. 202S: *Faust I and II*. 3 units each. *Jantz or Phelps*

205, 206. Middle High German. The language and literature of Germany's first classical period. C-L: Medieval and Renaissance Studies. 3 units each. *Westphal-Wihl*

207S. German Romanticism. The principal writers of the period from 1795 to 1830. 3 units. *Rolleston or Alt*

209S. Drama. Studies in the German-speaking theater with emphasis on the nineteenth century. 3 units. *Alt*

211S. Nineteenth-Century Literature. From the end of Romanticism through Realism. 3 units. *Alt*

214S. The Twentieth Century. Literature of the twentieth century presented through representative authors. 3 units. *Rolleston*

215S. Seventeenth-Century Literature. Leading writers of the baroque, viewed against the background of their time. C-L: Medieval and Renaissance Studies. 3 units. *Borchardt*

216. History of the German Language. Development of the phonology, morphology, and syntax of German from the beginnings to the present. C-L: Medieval and Renaissance Studies. 3 units. *Westphal-Wihl*

217S. Renaissance and Reformation Literature. The period from 1400 to about 1600. C-L: Medieval and Renaissance Studies. 3 units. *Borchardt*

218S. The Teaching of German. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks and related audiovisual materials. 3 units. *Phelps*

219. Applied Linguistics. The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. Prerequisite: consent of instructor. 3 units. *Westphal-Wihl*

COURSES CURRENTLY UNSCHEDULED

230S. Lyric Poetry

321, 322. Germanic Seminar

Health Administration

Professor Taylor, *Acting Chairman*; Professor Warren, *Director of Graduate Studies*; Professors Estes and Jaeger; Associate Professors Falcone and Wilkinson; Assistant Professors Martin and Smith; Adjunct Professors Kaluzny and Toomey; Adjunct Associate Professors Berry and Winfree; Adjunct Assistant Professors Adcock, Brown, Cusic, Diosegy, Donelan, Freund, Moore, and Yaggy; Associate Henderson-James

The Department of Health Administration offers graduate work leading to the M.H.A. degree. The graduate program is offered through two academic years and leads principally toward a career in the corporate management of complex health care delivery organizations. Students without previous administrative experience in the health field are encouraged to apply for a twelve-month administrative fellowship following graduation. Admission to the program is based upon the capability for graduate study and demonstrated leadership potential of the candidate.

300. Health Systems and Medical Care. Introduction to the organizational and professional components of the U.S. health care system: the past, present, and future of the health system; overview and consequences of health and illness for the delivery of health services; basic terminology, statistics, and epidemiology of health care delivery; the education, role, function, and interpersonnel relationships among the major health care professions with particular emphasis on physicians and nurses. 6 units. *Jaeger and Estes*

301. History of Health Care Delivery. An overview of the history of health care, primarily in America. Consideration of perennial problems of health and hospital

administration as these have been shaped by historical experience. 3 units. *Henderson-James*

303. Financial Management I. An overview of health care financial problems and management. Topics include financial statement analysis, working capital management, capital budgeting, and finance decisions in the health care environment. 3 units. *Taylor*

304. Financial Management II. The design, installation, administration, and evaluation of financial management control systems including standard cost systems, budgeting and performance reporting, internal control and federal controls, and reporting requirements. 3 units. *Taylor*

305. Financial Management III. An analysis of the financial structure of the health care industry. Topics include information relationships with financial markets, sources of external capital, and federal regulations relating to health care financing. 3 units. *Taylor*

306. Techniques of Management I. First of required two-semester sequence. Focuses broadly on theories and techniques of management in large scale health care organizations. Together with Health Administration 307 serves as a curriculum synthesis and capstone course. 3 units. *Staff*

307. Techniques of Management II. Second part of required sequence. Focuses via case studies on application of management theory and techniques in large scale health care organizations. 3 units. *Staff*

308. Cost-Benefit Analysis. Analysis of the relative efficiency, effectiveness, and efficacy of health services delivery programs, institutional arrangements, and administrative practices. Prerequisite: statistics. 3 units. *Falcone*

309. Health Care Marketing Management. Classical view of the marketing function as applied to the management of the health care organization. Particular attention is given to market-driven planning and implication. Instruction will be through reading, discussion, cases, and guests. 3 units. *Jaeger*

310. Statistical Analysis for Management Decisions. An introduction to probability theory and statistical inference. Topics in probability theory include probability models, random variables, discrete and continuous distributions, and the central limit theorem. Statistical topics emphasize the classical techniques of hypothesis testing and point and interval estimation, using the binomial, *t*, *F*, and chi-square distributions. 3 units. *Wilkinson*

311. Employee Relations and the Law. Survey of legal and operational implications of federal and state employment regulation with particular emphasis on the National Labor Relations Act and various anti-discrimination statutes. 3 units. *Adcock*

312. Comparative Health Systems. A comparative examination of the structure and performance of the health systems of the United States and other countries, particularly Canada and Great Britain. Topics include current financing, capitalization, utilization, control, and the relative roles of the governmental and private sectors. 3 units. *Falcone*

313. Quantitative Decision Making. A quantitative modeling framework to analyze management decisions in health administration provides the focus for the course. Areas of emphasis include the knowledge and skills needed to manage the analysis (i.e., formulation, assumptions, interpretation, cost of analysis) rather than on performing the analysis, stressing the process of analysis over details of technique. Decisions are analyzed both deterministically and stochastically, and on a scale from simple to complex. Techniques that serve the framework include calculus, inventory

theory, PERT, decision analysis, fixed versus variable cost analysis, queuing, simulation, and mathematical programming. Examples from the field are used extensively. The latter part of the course presents the concepts of quantitative control, with the same emphasis and again with examples from the field. 3 units. *Wilkinson*

320. Economics I: Micro-Macro. The purpose of this course is to present the techniques of economics to clarify important health issues. It provides a set of tangible skills of use throughout the health professions. For each of the six topics studied, an analytic framework will be developed to examine how individuals respond to the economics environment. 3 units. *Berry*

321. Economics II: Health. Determinants of the demand for hospital and physician services and for health insurance. Elements of provider behavior: physician-induced demand; substitution with mid-level practitioners; productivity. Hospital cost inflation and case mix measures are presented and evaluated. The course ends with a debate over competition versus regulation in health care. 3 units. *Freund*

322. Organizational Behavior and Design. A survey of behavioral science concepts and methods applied to the study and management of human behavior in health and human service organizations. Focus is on the manager's role in prevention and remediation of structural and behavioral dysfunctions with staff, clients, and organizations. 3 units. *Martin*

331. Planning Health Services: Systems Planning. This course focuses on planning for the delivery of health services at the systems level (regional, community). Emphasis is on the dynamics of the planning process, policy and values, and analytical measurement and evaluation techniques. 3 units. *Henderson-James*

332. Institutional and Facilities Planning. A basic course in the practice of institutional planning with emphasis on the total process of conceiving, planning, and constructing health care facilities. The course is more practical than theoretical in orientation. Primary emphasis is on the hospital, yet principles and methodology relate to other health care organizations. 3 units. *Swanson*

344. Human Resources Management. Follows in sequence Organizational Behavior. In-depth study of techniques of personnel development, problems of human relations in large-scale organizations, conflict resolution, personnel cluster management, problems and techniques of supervision, and other techniques and issues related to human resources management in organizations whose primary function is the delivery of health care. 3 units. *Martin*

345. Public Policy and Health Care. A study of the development and present status of selected public policy issues within their social, economic, and political contexts. Alternative courses of possible public action are reviewed and their probable outcomes are assessed. 3 units. *Falcone*

348. Legal Considerations in Health Administration. Introduction to law and the legal process as it relates to health administration, emphasizing the contribution that law makes to ethical and effective management practices. Topics include the constitutional basis for government support of health care services, constraints that law and regulations impose on the health care industry, public accountability, liability of health care providers, rights of patients, and administrative and business law for health care organizations. 3 units. *Warren*

350. Practicum in Health Services Administration. This course provides the student with the opportunity of working in administration in an institutional setting. The student, while observing the day-to-day routine problems of managing a health service institution, is responsible for a set of tasks, assignments, and projects nec-

essary to the functioning of the institution. A weekly session with faculty integrates this work experience and the student's academic training. 0 units. *Staff*

352. Ambulatory Health Services. This course covers the components of the organization and provision of personal health services in the ambulatory setting. Emphasis is on medical group management, including forms of organization, financing of services, physician-patient relationships, medical records, and peer review. 3 units. *Jaeger*

361, 362. Case Studies in Health Administration. An integrating course sequence consisting of analyses of cases taken from institutional and programmatic health service settings. 3 units each. *Smith*

367. Multi-Institutional Arrangements. A review of the history of various hospital systems and organizational arrangements. Discussion and study of the organizational structure, capital financing, and operational strategies. 3 units. *Toomey*

371, 372. Directed Research. Individual studies by arrangement. 3 units each. *Staff*

373. Current Legal Problems in Health Administration. This course follows up Health Administration 348 by providing an examination of selected current problems in health administration which are substantially affected by law and regulations. It is designed to acquaint students with the identification of legal problems in practical situations and to recognize legal alternatives. 3 units. *Warren*

375. Quality Assurance and Risk Management. Addresses legal and hospital management perspectives about organization and operation of a quality assurance/risk management program and insurance coverage. Topics include loss control, risk identification, incident reporting, staff education, claims file analysis, JCAH standards, malpractice prevention, brokerage, reinsurance and settlement procedures. 3 units. *Staff*

383. Program Development, Monitoring, and Evaluation. A review of methods used to construct local and national health service programs and associated grants development. The focus is on techniques of monitoring and evaluating problems found in program implementation and will identify principles used in their solution. Students will be required to demonstrate appropriate skills of synthesis, evaluation, and expression in response to case study material. 3 units. *Staff*

387. Information Systems. Technical and functional aspects of computerized hospital information systems from a management perspective, with emphasis on fundamentals of hardware and software, applications and system alternatives. 3 units. *Winfree*

388. Technology. Administrative implications of changes in technology anticipated in the next five to ten years. For this course, the term technology includes current medical and nonmedical developments (creating life forms, energy programs, population changes, new managerial techniques, laws and regulations). 3 units. *Henderson-James*

389. Corporate Planning for Health Services Organizations. Readings and cases on the purpose, process of determination, and evaluation of corporate objectives and strategies in a dynamic environment. 3 units. *Jaeger*

History

Professor A. Scott, *Chairman* (235 Allen); Professor Lerner, *Director of Graduate Studies* (237 Allen); Professors Cahow, Cell, Chafe, Colton, Davis, Durden, Holley, Maus-

kopf, Oates, Richards, W. Scott, TePaske, Witt, and Young; Associate Professors Bergquist, Dirlik, Gavins, Goodwyn, Kuniholm, Miller, Nathans, Roland, and Wood; Assistant Professors Barnett-Robisheaux, English, Ewald, Gaspar, Gordon, Herrup, Neuschel, and Reddy; Professor Emeritus Watson

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. Candidates for the A.M. degree must have a reading knowledge of at least one ancient or modern foreign language related to their programs of study and have completed successfully a substantial research paper, normally the product of a year's seminar or two semester courses. The paper must be approved by two readers—the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 1.

Candidates for the degree of Doctor of Philosophy are required to prepare themselves for examinations in four fields. Three usually shall be history. The choice of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the fields of Africa, Afro-American history, ancient history, medieval and early modern Europe, modern Europe, American history, Britain and the Commonwealth, Imperial Russia, Soviet Russia, Latin America, South Asia, China, modern Japan, military history, history of science, and history of medicine. The candidate for the Ph.D. degree usually must have a reading knowledge of two foreign languages, but in certain cases where the candidate's supervisor and the Director of Graduate Studies approve, and where the candidate's research for the dissertation would appreciably benefit, an alternative to the second language may be accepted. This alternative usually would take the form of successfully completed formal training in an auxiliary discipline (such as statistics or a course in one of the other social sciences with an emphasis upon methodology) of 3 to 6 units, or the equivalent, depending on the student's program. It also must be in addition to any previous undergraduate work in the discipline. The requirement, whether satisfied by two languages or by one language and an alternative, must be met prior to the preliminary examination.

Ancient History. For courses in ancient history which may be taken for credit in either history or classical studies, see Classical Studies.

For Seniors and Graduates

Students may receive credit for either semester of a hyphenated course at the 200 level without taking the other semester if they obtain written consent from the instructor.

201S. Aspects of Change in Prerevolutionary Russia. Origin and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of the labor movement. 3 units. *Miller*

202S. The Russian Revolution. 3 units. *Miller*

215-216. The Diplomatic History of the United States. (Not open to undergraduates who have had History 121, 122.) 6 units. *Davis*

217S, 218S. Western Europe in the Twentieth Century. Topics in political and social history: Europe in 1900; the impact of two world wars; the social politics of the great depression; fascism and nazism; economic recovery and changes after 1945. 3 units. *Colton*

219S, 220S. History of Science and Technology. The interaction of science and technology in the Western world from earliest times to the present. 3 units each. *Mauskopf and Roland*

221. Problems in the Economic and Social History of Europe, 1200-1700. C-L: Medieval and Renaissance Studies. 3 units. *Witt*

222. Problems in the Intellectual History of the European Renaissance and Reformation. Prerequisites: History 194 and ready knowledge of German, French, or Italian. C-L: Medieval and Renaissance Studies. 3 units. *Witt*

227-228. Recent United States History: Major Political and Social Movements. 6 units. *Chafe*

229S, 230S. Revolution in Modern Europe, 1789-1919. The French Revolution, the revolutions of 1830 and 1848, the Paris Commune, and the Russian and German revolutions of 1917 and 1918-1919. Emphasis on the evolution of historians' efforts at explanation of revolutions and on the relationship between social and political change. 3 units each. *Reddy*

231S, 232S. Problems in the History of Spain and the Spanish Empire. 3 units each. *TePaske*

234S. Political Economy of Development: Theories of Change in the Third World. C-L: Anthropology 234S, Political Science 234S, and Sociology 234S. 3 units. *Bergquist, Fox, Gereffi, Smith, and Valenzuela*

237S. Europe in the Early Middle Ages. C-L: Medieval and Renaissance Studies. 3 units. *Young*

238S. Europe in the High Middle Ages. C-L: Medieval and Renaissance Studies. 3 units. *Young*

239S. History of Socialism and Communism. Problems in the origins and development of socialist and communist movements. 3 units. *Lerner*

241-242. United States Constitutional History. 241: to 1865; 242: 1865 to the present. 6 units. *Cahow*

243-244. Marxism and History. 6 units. *Dirlik*

247. History of Modern India and Pakistan, 1707-1857. Analysis and interpretation, with special emphasis on social and economic change. 3 units. *Richards*

248. History of Modern India and Pakistan, 1857 to the Present. 3 units. *Richards*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. 6 units. *Holley*

253S, 254S. European Diplomatic History, 1871-1945. Origins of the First and Second World Wars, the diplomacy of the wars, and the peace settlements which followed them. 3 units each. *W. Scott*

260S. Economic History of Japan. Japanese economic development, stressing the period since the end of isolation. Prerequisite: one course in economic analysis of Far Eastern history. 3 units. *Staff*

262. Problems in Soviet History. Studies in the background of the Revolution of 1917 and the history and politics of the Soviet state. 3 units. *Lerner*

265S. Problems in Modern Latin American History. 3 units. *Bergquist*

269S-270S. British History, Seventeenth Century to the Present. Historiography of social structure and social change: English Revolution, party, the Industrial Revolution, class and class consciousness, Victorianism, and the impact of war in the twentieth century. 6 units. *Cell*

273S, 274S. Topics in the History of Science. Critical stages in the evolution of scientific thought. 3 units each. *Mauskopf*

277S. The Coming of the Civil War in the United States, 1820-1861. 3 units. *Durden*

278S. The Civil War in the United States and Its Aftermath, 1861-1900. 3 units. *Durden*

279, 280. Health, Healing, and History. The development of medicine within the broader cultural context from prehistory to the twentieth century. Not open to students who have had History 181, 182. 3 units each. *English*

282S. Canada. C-L: Anthropology 282S, Political Science 282S, and Sociology 282S. 3 units. *Leach*

285S, 286S. Oral History. Research on race relations and civil rights in the United States in the twentieth century using techniques of oral history. 3 units each. *Chafe and Goodwyn*

Seminars for Graduates

301-302. Research Seminar in History. Either this seminar or History 307-308 is required of all entering first-year doctoral candidates in history. 6 units. *Staff*

307-308. Seminar in United States History. Either this seminar or History 301-302 is required of all entering first-year doctoral candidates in history. 6 units. *Staff*

371-372. Research Seminars. To be taken either in conjunction with colloquia listed below or by special arrangement with appropriate graduate instructors when research seminars in a desired area are not offered. These seminars do not appear on the official schedule of courses. 6 units. *Staff*

Colloquia for Graduates

351-352. Colloquia. Each colloquium deals with an aspect of history by means of readings, oral and written reports, and discussion, with attention to bibliography. Ad hoc colloquia may be worked out during registration in the various fields represented by members of the graduate faculty; these colloquia do not appear on the official schedule of courses. In some instances, students may take the equivalent of a research seminar in conjunction with the colloquium and will be credited with an additional 6 units by registering for 371.1-372.1, etc.

Historiography and the Teaching of History—For Graduates

312. Seminar in the Teaching of History in College. The work in this course is intended to acquaint students with the problems involved in teaching history in college. Required of all candidates for the degree of Doctor of Philosophy who are in residence for two years at Duke. As an alternate method of meeting this requirement, a graduate student may, in cooperation with a member of the faculty, serve a one-semester teaching apprenticeship. No credit. Supervised by Director of Graduate Studies.

314. Historical and Social Science Methodology. Methods used in historical research with emphasis upon the various social science approaches. 3 units. *Te Paske*

History 314 is required of all candidates for the Ph.D. degree who are in residence for two years at Duke University.

392. Tutorial in Journal Editing. C-L: English 392. 3 units, ungraded. *Watson or Ferguson (English)*

Independent Study

399. Supervised independent study and reading, with consent of professor. 3 units.

COURSES CURRENTLY UNSCHEDULED

205S. Progressive Era in the United States and World War I

206S. The Nineteen-Twenties and the New Deal in the United States

224S. Seminar in Legal History

260S. Economic History of Japan

267S-268S. From Medieval to Early Modern England

317, 318. Seminar in the History of Western Europe

401. Seminar on the British Commonwealth

Humanities—The Master of Arts Program

Associate Professor Burian, *Director* (classical studies)

The Master of Arts Program in Humanities is an interdepartmental program and is tailored to the needs of individual students. The candidate defines a theme and selects appropriate course work with the aid and approval of a supervising committee. Thirty units of course work are required for completion of the program. The degree may be earned with or without a thesis. The candidate who chooses not to submit a thesis will submit instead at least two substantial papers arising from course work for review by committee members, and meets with them to discuss his or her program in a final master's colloquium.

The program is open to holders of undergraduate degrees in any discipline who can demonstrate sufficient background in humanities to permit study at the graduate level. Admission is by regular application to the Graduate School. Students may enroll full time or part time (minimum of 3 units per term). Students considering entering the program may enroll in an appropriate graduate course or courses through the Office of Continuing Education, at the same time making their interest known to the Director of the Humanities Program.

Liberal Studies—The Master of Arts Program

Bonnie E. Erickson, Ph.D., *Director*

This interdisciplinary program allows individuals with a variety of professional and personal educational interests the flexibility to pursue their interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students study primarily on a part-time basis and choose from an array of interdisciplinary courses developed specifically for this program. In addition to the special liberal studies courses listed below, students select other graduate-level courses that fit their individual needs and interests.

270. Selected Topics. (Core course open to M.A.L.S. students only.) 3 units.
Christensen

280. Selected Topics. (Core course open to M.A.L.S. students only.) 3 units.
Stewart and Witt

290. Selected Topics. (Core course open to M.A.L.S. students only.) 3 units.

Literature—The Ph.D. Program

Associate Professor Rolleston, *Chairman and Director of Graduate Studies* (07 Old Chemistry); Professors Duffey (English), Krynski (Slavic languages), Newton (classical studies), Ryals (English), Stewart (French), Tetel (French), Wardropper (Spanish), and Williams (English); Associate Professors Borchardt (German), Burian (classical studies), Caserta (Italian), DeNeef (English), Garci-Gómez (Spanish), Orr (French), Pérez (Spanish), and Thomas (French)

The interdepartmental program leading to a Ph.D. in literature offers to qualified students the opportunity to develop individual course sequences combining a series of core courses with selected courses in one or more of the departments of national literatures. Students entering the program must present evidence of ability to read two languages other than English, modern or classical; students commanding only one foreign language will learn a second during the first year of graduate study. The two-year program of courses includes a tutorial requirement: at least three courses must be taken on a tutorial basis, so that the student can rapidly acquire both specific research skills and broad perspectives on questions of literary theory and methodology.

Students' programs will be structured in consultation with the Committee for the Ph.D. in Literature. This committee, drawn from several literature departments, directs the program and advises students at every stage. More information on the program is provided in the "Special and Cooperative Programs" chapter of this bulletin; and a full descriptive brochure is available from Professor Rolleston, the Director of Graduate Studies.

301. Introduction to the Graduate Study of Literature. History and theory of concepts central to literary studies: genre, period, reference and self-reference, style, influence, literary studies as institution. 3 units. *Pérez and staff*

302. Criticism and Literary Theory in the Twentieth Century. Introduction to critical philosophies, movements, and strategies informing current theory: formalism, new criticism, phenomenology, structuralism, psychoanalysis, semiology, deconstruction, feminism. 3 units. *Stewart, Orr, Rolleston, Thomas, and staff*

303. Special Topics in Structure, Genre, and Periodization. 3 units. *Staff*

304. Philology, Linguistics, and the Roots of Literature. A survey of the various ways in which language and literature interact, with an introduction to philology and historical linguistics. 3 units. *Thomas and staff*

Marine Sciences—The University Program

Professor Costlow, *Director* (zoology); Associate Professor Ramus, *Assistant Director for Academic Programs and Director of Graduate Student Affairs* (botany); Professors Barber (botany and zoology), Gutknecht (physiology), Pilkey* (geology), and Searlest (botany); Associate Professors Forward (zoology), Johnson (geology), McClay† (zoology), Sullivan (biochemistry), and Sutherland (zoology); Professor Emeritus Bookhout (zoology); Assistant Medical Research Professors C. Bonaventura (biochemistry) and J. Bonaventura (biochemistry)

Graduate students from any and all academic disciplines are encouraged to take professional training at the Marine Laboratory. The program operates year-round, providing course work in the marine sciences, an active seminar program, and facil-

*In residence during spring only.

†In residence during summer only.

ities supporting dissertation research. Resident graduate students represent the Departments of Biochemistry, Botany, Forestry and Environmental Studies, Geology, Physiology, and Zoology. Ordinarily, dissertation advisers are resident as well, although this need not be the case. The Marine Laboratory has available three full-time instructional assistantships and a number of summer instructional assistantships for graduate student support. In addition, tuition credits obtained from fellowship support may be applied to courses given both at the Marine Laboratory and the Durham campus.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the laboratory should be addressed to the Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Additional information and the application form are included in the *Bulletin of Duke University: Marine Laboratory*. The application for enrollment in summer courses at the laboratory should be accompanied by transcripts of undergraduate and graduate work. Applications should be received as early as possible. Graduate students planning to enroll in courses or seminars offered during the fall or spring at the Marine Laboratory should notify the Admissions Office of the Marine Laboratory of such intent *prior* to the beginning of the respective semester.

Students registering for research should do so under the appropriate departmental numbers.

The following courses are offered at Beaufort. See the Marine Laboratory bulletin for the current schedule of courses.

SUMMER PROGRAM AT BEAUFORT

For Seniors and Graduates

203L. Marine Ecology. Application of ecological theory to marine systems. Mathematical properties of population growth and species interactions; field and laboratory projects with computer-assisted analysis of data. Practice in scientific writing. Readings from current scientific publications. Prerequisites: introductory biology or invertebrate zoology and calculus; knowledge of statistics recommended. C-L: Zoology 203L. 6 units. *Sutherland*

215L. Primary Productivity in the Seas. The biological flux of carbon in the coastal and open seas involving phytoplankton, seaweeds, seagrasses, and marshgrasses. The contributions of these primary producers to food chain processes and global atmospheric-sedimentary cycles, as well as the ecological consequences of variations in photosynthetic mechanisms. Prerequisites: introductory biology and introductory chemistry. C-L: Botany 215L and Zoology 215L. 4 units. *Barber and Ramus*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. C-L: Botany 218 and Forestry and Environmental Studies 218. 6 units. *Leatherman (visiting summer faculty)*

219L. Benthic Marine Algae. Morphology, reproduction, life histories, systematics, and natural history of seaweeds. Lectures, laboratories, and fieldwork in ocean and estuaries. Prerequisite: introductory biology; plant diversity recommended. C-L: Botany 219L. 4 units. *Searles*

250L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. C-L: Zoology 250L. 4 units. *Forward*

263L. Tropical Seaweeds. Collection, preservation, description, identification, illustration, and descriptive ecology. Two-week field study in the Bahamas. Prerequisite: Botany 145L or equivalent or consent of instructor. C-L: Botany 263L. 2 units. *Searles*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips included. Not open to students who have had Zoology 175 or 275. Prerequisite: introductory biology. C-L: Zoology 274L. 6 units. *Barnes (visiting summer faculty)*

276. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of instructor. C-L: Biochemistry 276. 6 units. *Sullivan*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. C-L: Zoology 278L. 6 units. *McClay and visiting staff*

295S. Behavior and Ecology of Fishes. Behavioral theory applied to life history patterns, predation, competition, and community structure. Laboratory and field projects. Basic ecology, evolution, or behavior course recommended. C-L: Zoology 295S. 4 units. *Staff*

353, 354. Research. Hours to be arranged. Prior approval of instructor at the Duke University Marine Laboratory is required. For graduate students only. C-L: Zoology 353, 354. *Staff*

359, 360. Research. Hours to be arranged. Prior approval of instructor at the Duke University Marine Laboratory is required. For graduate students only. C-L: Botany 359, 360. *Staff*

FALL PROGRAM AT BEAUFORT

For Juniors, Seniors, and Graduates

209. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. C-L: Biochemistry 209, 210. Credit to be arranged. *Staff*

245L. Macromolecules, Ecology, and Evolution. The structure and function of protein and nucleic acid molecules with particular emphasis on the application of molecular techniques to questions in ecological, systematic, and evolutionary theory. C-L: Biochemistry 245L. 3 units. *Sullivan*

Seminar. Special topics in the marine sciences. Exploration at the advanced level of current research in the marine sciences. Subject dependent on faculty and student interests. C-L: Botany 295S, Physiology 219S, and Zoology 295S. 2 units. *Staff*

SPRING PROGRAM AT BEAUFORT

For Juniors, Seniors, and Graduates

203. Physical Oceanography. An introduction to physical processes in the oceans, including the physical properties of seawater, the dynamics of currents, waves and

tides, and the transmission of light and sound in the sea. Prerequisite: Physics 41 or 51. C-L: Geology 203. 2 units. *Johnson*

204. Chemical Oceanography. An introduction to chemical processes in the oceans, including factors controlling the major ion composition of sea salt, the distribution of dissolved gasses in seawater, sediment-seawater interactions, and seawater-basalt interactions at oceanic ridge crests. Prerequisites: Chemistry 11 and Geology 203 (may be taken concurrently). C-L: Geology 204. 3 units. *Staff*

205S. Geological Oceanography. The geology of ocean basins, including origin, bottom physiology, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. C-L: Geology 205S. 4 units. *Johnson*

210. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. C-L: Biochemistry 209, 210. Credit to be arranged. *Staff*

220L. Adaptations of Organisms to the Marine Environment. Introduction to basic concepts of biochemistry and to variables in the marine environment which evoke adaptive responses. Specific adaptations at the molecular level. Biological fitness from a biochemical viewpoint. Prerequisites: introductory biology and organic chemistry and consent of instructor. C-L: Biochemistry 220L. 4 units. *C. Bonaventura and J. Bonaventura*

Seminar. Special topics in the marine sciences. Exploration at the advanced level of current research in the marine sciences. Subject dependent on faculty and student interest. C-L: Biochemistry 220S, 265S, 266S; Botany 295S, 296S; and Zoology 295S, 296S. 2 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

247L. Plant Ecology

Mathematics

Professor Reed, *Chairman* (215 Physics); Associate Professor Moore, *Director of Graduate Studies* (121B Physics); Professors Allard, Beale, DiPerna, Griffiths, Schaeffer, Shoenfield, Warner, and Weisfeld; Associate Professors Burdick, Hodel, Kitchen, Kraines, Pardon, Schonbek, Scoville, and Smith; Assistant Professors Cheney, Lawler, Miksis, Nance, Schoen, Shearer, and Sylvester; Adjunct Professors Bernstein and Chandra; Lecturer Edelstein

Graduate work in the Department of Mathematics is offered leading to the M.S., A.M., and Ph.D. degrees. Admission to these programs is based on the applicant's undergraduate academic record, level of preparation for graduate study, the Graduate Record Examination, and letters of recommendation.

All A.M. and Ph.D. candidates are required to pass a qualifying examination after completing their first year of graduate study. The A.M. degree with a major in mathematics is awarded upon completion of 30 units of graded course work and passing the qualifying examination. A thesis may be substituted for 6 units of course work only under special circumstances. The department also offers a program in applied statistics with a minor in computer science leading to the M.S. degree.

Candidacy for the Ph.D. is established by passing the qualifying examination at the Ph.D. level, completing the department's language requirements, and passing an oral preliminary examination. The preliminary examination is normally taken at the beginning of the third year. The preliminary examination is conducted by a committee selected by the rules of the Graduate School and the department. The examination can, at the student's option, consist of questions based either on the student's course

work at Duke or on the specific area of research plus a minor subject selected by the student.

After admission to candidacy, the Ph.D. degree is awarded on the basis of the student's scholarly ability as demonstrated by the dissertation and its defense. The dissertation is the most important requirement in the award of the Ph.D. degree.

For Seniors and Graduates

200. Introduction to Algebraic Structures I. Laws of composition, groups, rings; isomorphism theorems; axiomatic treatment of natural numbers; polynomial rings; division and Euclidean algorithms. Prerequisite: Mathematics 104 or equivalent. 3 units. *Staff*

201. Introduction to Algebraic Structures II. Vector spaces, matrices and linear transformations, fields, extensions of fields, construction of real numbers. Prerequisite: Mathematics 200 or equivalent. 3 units. *Staff*

203. Basic Analysis I. Topology of \mathbb{R}^n , continuous functions, uniform convergence, compactness, infinite series, theory of differentiation, and integration. Not open to students who have had Mathematics 139. Prerequisite: Mathematics 104. 3 units. *Staff*

204. Basic Analysis II. Inverse and implicit function theorems, differential forms, integrals on surfaces, Stokes' theorem. Not open to students who have had Mathematics 140. Prerequisite: Mathematics 203. 3 units. *Staff*

205. Topology. Elementary topology, surfaces, covering spaces, Euler characteristic, fundamental group, homology theory, exact sequences. Prerequisite: Mathematics 104. 3 units. *Staff*

206. Differential Geometry. Geometry of curves and surfaces, the Serret-Frenet frame of a space curve, the Gauss curvature, Codazzi-Mainardi equations, the Gauss-Bonnet formula. Prerequisite: Mathematics 104. 3 units. *Staff*

221, 222. Numerical Analysis I, II. C-L: Computer Science 221, 222. 3 units each. *Gallie, Patrick, or Utku*

230. Mathematical Methods in Physics and Engineering I. Heat and wave equations, initial and boundary value problems, Fourier series, Fourier transforms, potential theory. Not open to students who have had Mathematics 114. Prerequisites: Mathematics 103 and 104 or equivalents. 3 units. *Staff*

231. Mathematical Methods in Physics and Engineering II. Green's functions, propagators, integral equations, spectral theory on Hilbert space, Fredholm alternative, variational methods. Prerequisite: Mathematics 114 or Mathematics 230. 3 units. *Staff*

234. Mathematics for Quantum Mechanics. Hilbert space, self-adjoint operators, the mathematical model of quantum mechanics, commutation relations, spectral analysis of Hamiltonians, time dependent scattering theory. Prerequisites: Mathematics 230 and 231 or equivalents. 3 units. *Staff*

238, 239. Topics in Applied Mathematics. Conceptual basis of applied mathematics, combinatorics, graph theory, game theory, mathematical programming, or numerical solution of ordinary and partial differential equations. Prerequisites: Mathematics 103 and 104 or equivalents. 6 units. *Staff*

240. Applied Stochastic Processes. Applications of probability theory and stochastic processes to economics and environmental science. Markoff chains, optional stopping, queuing theory, decision theory, birth and death processes, and the Monte-Carlo method. Prerequisite: Mathematics 135 or equivalent. 3 units. *Staff*

241. Linear Models. Geometric interpretation, multiple regression, analysis of variance, experimental design, analysis of covariance. Prerequisite: Mathematics 136 or equivalent. 3 units. *Staff*

242. Multivariate Statistics. Multinormal distributions, multivariate general linear model, Hotelling's T^2 statistic, Roy union-intersection principle, principal components, canonical analysis, factor analysis. Prerequisite: Mathematics 241 or equivalent. 3 units. *Staff*

248, 249. Topics in Statistics. Analysis of variance, design of experiments, non-parametric statistics, foundations of statistical inference. Prerequisite: consent of instructor. 6 units. *Staff*

250. Introductory Mathematical Logic. First-order logic, completeness theorem, compactness theorem, introduction to recursive functions, incompleteness theorem. Prerequisite: Mathematics 187 or Mathematics 200 or equivalent. 3 units. *Staff*

251. Set Theory I. Zermelo-Fraenkel axioms, ordinals and cardinals, models of set theory, constructible sets. Prerequisite: Mathematics 187 or Mathematics 200 or equivalent. 3 units. *Staff*

252. Set Theory II. Forcing, large cardinals, determinateness, and other advanced topics. Prerequisite: Mathematics 251. 3 units. *Staff*

258, 259. Topics in Logic. Model theory, recursion theory, set theory, or other fields of logic. Prerequisite: Mathematics 250 or equivalent. 6 units. *Staff*

260. Groups, Rings, Modules. Elementary categorical algebra, groups, rings, modules, linear and multilinear algebra. Prerequisite: Mathematics 201 or equivalent. 3 units. *Staff*

261. Commutative Algebra. Fields, Noetherian rings and modules, Dedekind domains. Prerequisite: Mathematics 260 or equivalent. 3 units. *Staff*

268, 269. Topics in Algebra. Algebraic number theory, algebraic K -theory, homological algebra, or topological algebra. Prerequisite: Mathematics 260. 6 units. *Staff*

271. Algebraic Topology. Fundamental group and covering spaces, homology groups of cell complexes, classification of compact surfaces, the cohomology ring, and Poincaré duality for manifolds. Prerequisites: Mathematics 171S and 200 or equivalents. 3 units. *Staff*

278, 279. Topics in Topology. Point set, algebraic, geometric, or differential topology. Prerequisite: consent of instructor. 6 units. *Staff*

280. Differential Analysis. Differential calculus, ordinary differential equations, flows, Lie bracket, total differential equations, first order partial differential equations, deRham theory. Prerequisite: Mathematics 140 or equivalent. 3 units. *Staff*

281. Real Analysis I. Measures, Lebesgue integral, L^p -spaces, Daniell integral, differentiation theory, product measures. Prerequisite: Mathematics 140 or equivalent. 3 units. *Staff*

282. Real Analysis II. Metric spaces, fixed point theorems, Baire category theorem, Banach spaces, fundamental theorems of functional analysis, Fourier transform. Prerequisite: Mathematics 281 or equivalent. 3 units. *Staff*

283. Linear Operators. Bounded and unbounded operators on Banach and Hilbert spaces, symmetric and self-adjoint operators, Banach algebras, spectral theorem, unitary groups, compact operators, Fredholm theory, accretive operators, semigroups of operators. Prerequisite: Mathematics 282 or equivalent. 3 units. *Staff*

284. Topics in Functional Analysis. Advanced spectral analysis, operator algebras, nonlinear functional analysis, or structure theory of Banach spaces. Prerequisite: Mathematics 282 or equivalent. 3 units. *Staff*

285. Complex Analysis. Complex calculus, conformal mapping, Riemann mapping theorem, Riemann surfaces. Prerequisite: Mathematics 140 or equivalent. 3 units. *Staff*

286. Topics in Complex Analysis. Geometric function theory, function algebras, several complex variables, uniformization, or analytic number theory. Prerequisite: Mathematics 285 or equivalent. 3 units. *Staff*

288, 289. Topics in Analysis. Harmonic analysis, dynamical systems, geometric measure theory, or calculus of variations. Prerequisites: Mathematics 281 and 285 or equivalents. 6 units. *Staff*

290. Probability. Random variables, independence, expectations, laws of large numbers, central limit theorem, Markoff chains. Prerequisite: Mathematics 281 or equivalent. 3 units. *Staff*

293, 294. Topics in Probability Theory. Ergodic theory, multiparameter stochastic processes and random fields, stochastic control theory, or stochastic differential equations. Prerequisite: Mathematics 291 or equivalent. 6 units. *Staff*

297. Fourier Analysis and Distribution Theory. Tempered distributions, Fourier transforms, classical inequalities, oscillatory integrals. Prerequisites: Mathematics 140 and 285 or equivalents. 3 units. *Staff*

298. Partial Differential Equations I. Fundamental solutions of linear partial differential equations, hyperbolic equations, characteristics, Cauchy-Kovalevskaya theorem, propagation of singularities. Prerequisite: Mathematics 297 or equivalent. 3 units. *Staff*

299. Partial Differential Equations II. Elliptic boundary value problems; regularity theorems; the diffusion equation; nonlinear equations. Prerequisite: Mathematics 298 or equivalent. 3 units. *Staff*

388, 389. Current Research in Analysis. 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

235. Topics in Mathematical Physics

358, 359. Current Research in Logic

368, 369. Current Research in Algebra

378, 379. Current Research in Topology

387. Current Research in Mathematical Physics

Program in Medieval and Renaissance Studies

Professor Tetel, *Chairman and Director of Graduate Studies* (213 Languages)

The graduate Program in Medieval and Renaissance Studies is an interdisciplinary program administered by the Duke University Center for Medieval and Renaissance Studies. In consultation with the Director of Graduate Studies, students in the program select courses in art, history, music, philosophy, religion, language, and literature (classical studies, English, German, and Romance languages). The program is described in the chapter "Special and Cooperative Programs." For descriptions of the individual courses see the listings under the specified department.

DEPARTMENT OF ART

- 230S. Medieval and Byzantine Art and Architecture. *Bruzelius or Epstein*
- 232S. Romanesque and Gothic Art and Architecture. *Bruzelius*
- 240. Italian Art. *Goffen or Spencer*
- 242S. Studies in Italian Renaissance Art. *Goffen or Spencer*
- 243S. Studies in Northern Art. *Melion*

DEPARTMENT OF CLASSICAL STUDIES

- 221. Medieval Latin. *Newton*
- 312. Proseminar in Latin Paleography. *Newton*

DEPARTMENT OF ENGLISH

- 207. Old English Language and Literature. *Nygard*
- 208. History of the English Language. *Nygard*
- 212. Middle English Literature: 1100 to 1500. *Nygard*
- 221. Renaissance Prose and Poetry: 1500 to 1660. *DeNeef, Randall, or G. Williams*
- 225. Renaissance Drama: 1500 to 1642. *Randall or G. Williams*
- 312. Studies in Middle English Literature. *Nygard or Robertson*
- 315. Studies in Chaucer. *Nygard or Robertson*
- 321. Studies in Renaissance Literature. *DeNeef, Randall, or G. Williams*
- 324. Studies in Shakespeare. *G. Williams or Porter*
- 329. Studies in Milton. *DeNeef*
- 383. Textual Criticism. *G. Williams*

DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURE

- 205, 206. Middle High German. *Borchardt*
- 215S. Seventeenth-Century Literature. *Borchardt*
- 216. History of the German Language. *Westphal-Wihl*
- 217S. Renaissance and Reformation Literature. *Borchardt*

DEPARTMENT OF HISTORY

- 221. Problems in the Economic and Social History of Europe, 1200–1700. *Witt*
- 222. History of the Renaissance. *Witt*
- 237S. Europe in the Early Middle Ages. *Young*
- 238S. Europe in the High Middle Ages. *Young*
- 267S–268S. From Medieval to Early Modern England. *Staff*

DEPARTMENT OF MUSIC

- 201. Introduction to Musicology. *Bartlett*
- 211. Medieval Notation. *Staff*
- 212. Renaissance Notation. *Staff*
- 221. Music in the Middle Ages: Monophony. *Seebass*
- 222. Music in the Middle Ages: Polyphony. *Seebass*
- 223. Music in the Renaissance. *Staff*
- 312S. Seminar in Renaissance Music. *Staff*
- 351S. Studies in Musical Iconography. *Seebass*

DEPARTMENT OF PHILOSOPHY

- 218S. Medieval Philosophy. *Mahoney*
- 219S. Late Medieval and Renaissance Philosophy. *Mahoney*

DEPARTMENT OF RELIGION

- 219. Augustine. *Gregg*
- 236. Luther and the Reformation in Germany. *Steinmetz*
- 241. Problems in Reformation Theology. *Steinmetz*
- 334. Theology and Reform in the Later Middle Ages. *Steinmetz*
- 337. Theology of St. Thomas Aquinas. *Staff*
- 338. Calvin and the Reformed Tradition. *Steinmetz*
- 339. The Radical Reformation. *Steinmetz*

DEPARTMENT OF ROMANCE LANGUAGES

French

- 211. History of the French Language. *Hull*
- 248. French Literature of the Seventeenth Century. *Staff*
- 325. French Prose of the Sixteenth Century. *Tetel*
- 326. Topics in Renaissance Poetry. *Tetel*
- 391, 392. French Seminar (medieval and Renaissance topics). *Tetel and staff*

Italian

284, 285. Dante. *Caserta*

Spanish

210. History of the Spanish Language. *Garci-Gómez*

251. The Origins of Spanish Prose Fiction. *Wardropper*

253. Cervantes. *Wardropper*

254. Drama of the Golden Age. *Wardropper*

258. Spanish Lyric Poetry before 1700. *Wardropper*

391, 392. Hispanic Seminar (medieval and Renaissance topics). *Fein, Garci-Gómez, Osuna, Pérez, and Wardropper*

COURSES CURRENTLY UNSCHEDULED

Classical Studies 306. Latin Seminar VI

Classical Studies 327. Seminar in Byzantine History

English 210. Old English Literary Tradition

English 310. Studies in Old English Literature

English 380. Studies in Ballad and Folksong

Music 311S. Seminar in Medieval Music

Religion 206. Christian Mysticism in the Middle Ages

Religion 251. The Counter-Reformation and the Development of Catholic Dogma

Religion 344. Zwingli and the Origins of Reformed Theology

Microbiology and Immunology

Professor Joklik, *Chairman* (414A Jones); Professor Willett, *Director of Graduate Studies* (420 Jones); Professors Amos, Bolognesi, R. Buckley, Day, Metzgar, Osterhout, Rosse, Seigler, Snyderman, Ward, and Wheat; Associate Professors Bastia, Corley, Cresswell, Dawson, Endow, Keene, Linney, Mitchell, and Sage; Assistant Professors Adams, Argon, C. E. Buckley III, Haynes, Kreuzer, McClay, Ostrowski, and Pisetsky; Associate Medical Research Professor Miller; Assistant Medical Research Professors Burdett and Sedwick

The department offers graduate work leading to the Ph.D. degree. Specialization is possible in molecular virology, viral oncology, cell biology, tumor biology, molecular microbiology, molecular genetics, immunochemistry, immunogenetics, cancer immunology, general immunology, and medical mycology.

Undergraduate preparation in the biological and physical sciences and in biochemistry is required. A brochure describing the Ph.D. degree program, prerequisites for admission, and research in the department can be obtained by writing the Director of Graduate Studies, Box 3020, Duke University Medical Center, Durham, North Carolina 27710.

214. Fundamentals of Electron Microscopy. An introduction to the basics of electron microscopy, specimen preparation, and ultramicrotomy. Open only to graduate students in microbiology and immunology. 2 units. *Miller*

219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Pathology 219, and Physiology 230. *Counce, McCarty, and staff*

221. Medical Microbiology. An intensive study of common bacteria, viruses, fungi, and parasites which cause disease in humans. The didactic portion of the course focuses on the nature and biological properties of microorganisms causing disease, the manner of their multiplication, and their interaction with the entire host as well as specific organs and cells. 4 units. *Joklik and staff*

234. Introduction to Biostatistical Methods. Elementary statistical procedures having special application to biological research. Special emphasis on the interpretation of parameters and the appropriateness of assumptions in the biological/laboratory setting. Prerequisite: elementary mathematics including college algebra. C-L: Pharmacology 302. 3 units. *Dawson*

236. Statistical Methods in Human Genetics. An introduction to statistical procedures for determining and predicting the inheritance of human characteristics through studies of families and of populations, including the testing of genetic hypotheses and the estimation of genetic parameters from human data. Prerequisite: introductory genetics. 3 units. *Dawson*

238. Intermediate Biostatistics and Data Analysis. A consideration of statistical methods having special application to biological research, including the analysis of variance, multiple regression, nonparametric statistics, and bioassay, as well as the use of statistical computer packages. Prerequisite: Microbiology and Immunology 234 or equivalent. 3 units. *Dawson*

244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include the anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Zoology 160 and Chemistry 152. C-L: Zoology 244. 3 units. *Whisnant and staff*

246S. Parasitic Diseases. Topics in the physiology and immunology of major human and animal parasites with an emphasis on protozoa and schistosomes. Extensive reading in and discussion of current literature. Basic parasitology developed in introductory readings and lectures. Prerequisites: Microbiology and Immunology 244 or 291, and Biochemistry 227 or equivalent. 3 units. *Balber*

252. General Virology and Viral Oncology. The first half of the course will be devoted to a discussion of the structure and replication of mammalian and bacterial viruses. The second half deals specifically with tumor viruses, which are discussed in terms of the virus-cell interaction, the relationship of virus infection to neoplasia, and the role of the immunological response to tumor virus infection. Prerequisite: consent of instructor. 4 units. *Keene and staff*

259. Molecular Biology I: Protein and Membrane Structure/Function. C-L: Anatomy 259, Biochemistry 259, and the University Program in Cell and Molecular Biology. 3 units. *Richardson and staff*

268. Molecular Biology II: Nucleic Acids. C-L: Biochemistry 268, Botany 268, and the University Program in Cell and Molecular Biology. 3 units. *Modrich and staff*

269. Advanced Cell Biology. C-L: Anatomy 269, Botany 269, the University Program in Cell and Molecular Biology, and Zoology 269. 3 units. *Endow and staff*

291. Comprehensive Immunology. An intensive course in the biology of the immune system and the structure and function of its component parts. Major topics discussed are: properties of antigens; specificity of antibody molecules and their biologic functions; cells and organs of the lymphoid system; structure and function of complement; inflammation and non-specific effector mechanisms; cellular interactions and soluble mediators in lymphocyte activation, replication, and differentiation; regulation of immune responses; neoplasia and the immune system; molecular structure and genetic organization of a) immunoglobulins, b) histocompatibility antigens, and c) T-cell receptor. 4 units. *Finn, Argon, and staff*

296. Contemporary Molecular Immunology. A detailed study at the molecular level of some of the latest developments in immunology. The subject matter will be concerned with three general areas: (a) the molecular analysis of the cellular components and processes which underlie the biological behavior of cells involved in immune phenomena; (b) the chemical and physical properties of antigens and antibodies and the physical-chemical analysis of antigen-antibody interaction; (c) recent methodological advances contributing to or resulting from (a) and (b). Prerequisite: introductory immunology or equivalent. 3 units. *Cresswell, Day, and Sage*

For Graduates

323. Topics in Cell and Molecular Biology. An advanced treatment of special topics and recent developments in cell and molecular biology. 2 units. *Staff*

325. Medical Mycology. Comprehensive lecture and laboratory coverage of all the fungi pathogenic for humans. Practical aspects as well as future trends in the mycology, immunology, diagnosis, pathogenesis, and epidemiology of each mycotic agent will be explored. There will be several invited lecturers, each an internationally recognized scientist, discussing his or her particular area of mycological expertise and current research. Prerequisite: consent of instructor. 4 units. *Mitchell*

330. Medical Immunology. A comprehensive course in medical immunology which attempts to define the role that immunology plays in the etiology, diagnosis, nosology, and therapy of human disease. 6 units. *Metzgar and staff*

331.1-331.8. Microbiology Seminar. Current topics in microbiology with seminars presented by students, faculty, and outside speakers. Required course for all students specializing in microbiology. 1 unit each. *Staff*

332.1-332.8. Immunology Seminar. Current topics in immunology with seminars presented by students, faculty, and outside speakers. Required course for all students specializing in immunology. 1 unit each. *Staff*

336. Contemporary Topics in Immunogenetics. Selected themes in immunogenetics with special emphasis on molecular approaches. The major areas discussed are: the nature, interaction, and expression of immunoglobulin genes and T-cell receptor genes, the genes of the major histocompatibility complex, and the genes of the T/t complex. The central ideas discussed include the manner in which cells recognize and interact with each other in phylogeny, ontogeny, and in differentiation; how gene families evolve and interact; and how information about these complex genetic systems is used in basic research and in clinical medicine. Prerequisite: Microbiology and Immunology 244 or 291 or 330 or equivalent. C-L: Genetics — The University Program. 2 units. *Amos and Ward*

COURSES CURRENTLY UNSCHEDULED

219S. Seminar

242. Mechanisms of Microbial Pathogenicity

282. Molecular Microbiology

420. Cellular Immunophysiology

Music

Professor Douglass, *Chairman* (105 Mary Duke Biddle Music Building); Associate Professor Todd, *Director of Graduate Studies* (079 Mary Duke Biddle Music Building); Professor Ward; Associate Professor Seebass; Assistant Professors Agawu, Bartlet and Jaffe

The Department of Music offers graduate work leading to the A.M. and Ph.D. degrees in musicology and the A.M. degree in composition. For the musicology program, applications are invited from students completing undergraduate curricula in music, as well as from qualified students in related disciplines. Nondegree students and especially graduate students from other departments may be admitted to graduate courses by consent of the instructor, according to their preparation. Students may be admitted to the Program in Medieval and Renaissance Studies (see section on Medieval and Renaissance Studies). A reading knowledge of one foreign language is

required at admission; two are required for the A.M. (including German), and three for the Ph.D. (usually including German and Latin). Students are strongly urged to acquire as much language facility as possible before beginning graduate study.

For the composition program, the department invites applications from student composers who are completing or have completed their undergraduate work. A reading knowledge of one foreign language is required.

A detailed description of the requirements for the A.M. and Ph.D. is available upon request from the Director of Graduate Studies. The student should refer also to the description of general requirements of the University found in the chapter "Program Information."

201. Introduction to Musicology. Introduction to and assessment of reference materials, other bibliographic tools, and research methods for the field of musicology. Prerequisite: consent of instructor. 3 units. *Bartlet*

211. Medieval Notation. Introduction to codicology and paleography; notation of plain chant and of polyphony through the fourteenth century. 3 units. *Staff*

212. Renaissance Notation. Mannered notation; fifteenth-century white notation; proportions; instrumental scores, partituras, and tablatures. Prerequisite: Music 211 or consent of instructor. 3 units. *Staff*

213. Theories and Notation of Contemporary Music. Selected topics. 3 units. *Staff*

215, 216. Problems in Music Analysis. Selected topics. 3 units each. *Agawu*

221. Music in the Middle Ages: Monophony. Selected topics. 3 units. *Seebass*

222. Music in the Middle Ages: Polyphony. Selected topics. 3 units. *Seebass*

223. Music in the Renaissance. Selected topics. 3 units. *Staff*

224. Music in the Baroque Era. Selected topics. 3 units. *Douglass*

225. Music in the Classic Era. 3 units. *Staff*

226. Music in the Romantic Era. Selected topics. 3 units. *Todd*

227. Music in the Postromantic and Modern Eras. Selected topics. 3 units. *Todd*

290. Independent Study. 3 units. *Staff*

296S. Analysis of Recent Contemporary Music. Selected topics. 3 units. *Staff*

297, 298, 299. Composition. Selected topics. 3 units each. *Staff*

312S. Seminar in Renaissance Music. 3 units. *Staff*

315S. Seminar in Nineteenth- and Twentieth-Century Music. 3 units. *Staff*

341S. Problems in Music Theory. 3 units. *Todd*

351S. Studies in Musical Iconography. 3 units. *Seebass*

COURSES CURRENTLY UNSCHEDULED

311S. Seminar in Medieval Music

313S. Seminar in Baroque Music

314S. Seminar in the Classic Period

382S. Studies in Ethnomusicology

392S. Interdisciplinary Colloquium

Generally topics of the seminars will be announced one semester in advance. Among the offerings may be: The Place of Music in Carolingian Culture; Theory and Practice of *Musica Ficta*; Monteverdi and his Time; The Classic Lied; The Music of Mendelssohn; Programmatic and Absolute Music in the Nineteenth Century; Elements of Musical Acculturation in Bali and Lombok (Indonesia); and French Organ Music.

The University Program in Neurobiology

Professor Diamond, *Director* (psychology); Professors Erickson (psychology), Hall (anatomy), Somjen (physiology), and Vanaman (microbiology and immunology); Associate Professors Graham (pathology) and Kaufman (biochemistry); Assistant Professor Nadler (pharmacology)

Recent advances in neurobiology have resulted in new methods, such as immunohistochemistry, and in closer ties among the various approaches to studying the nervous system. For example, research on the neuroanatomical basis of behavior is more dependent than ever before on the chemical and cellular study of neurons. To keep pace with these changes the program in neurobiology has been designed for a small number of students who wish to study the nervous system at several levels, ranging from the molecular to the behavioral. In planning course work, each student will be guided by an advisory committee whose members come from a variety of departments. All students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Each student must affiliate with one of the participating departments—anatomy, biochemistry, microbiology and immunology, pathology, pharmacology, physiology, psychology, and zoology—and must meet all the requirements of that department for the Ph.D. degree. Normally, the dissertation adviser and the student will be members of the same department. A complete list of faculty, including research interests, will be made available to prospective students. *See course listings under the participating departments.*

Pathology

Professor Jennings, *Chairman* (301B Davison); Professor D. Bigner, *Director of Graduate Studies* (207 Jones); Professors Adams, Bossen, Bradford, Fetter, Hackel, Johnston, Klintworth, Koepke, Pratt, Sommer, Vogel, and Wittels; Associate Professors S. Bigner, Burger, Elchlepp, Graham, McCarty, Michalopoulos, Pizzo, Reimer, Sanfilippo, Shelburne, and Zwadyk; Assistant Professors Abernethy, Jirtle, and Schold; Adjunct Associate Professor Swenberg; Adjunct Assistant Professor Brody; Assistant Clinical Professor Vollmer; Assistant Medical Research Professor Wikstrand

The Department of Pathology offers graduate work leading to the M.S. and Ph.D. degrees with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of modern research techniques. Students will be required to take such courses as are necessary to obtain a broad foundation, as well as courses applicable to areas of speciality and research. Further information including brochures giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Physiology 230. 3 units. *Padilla and staff*

250. General Pathology. The fundamentals of pathology are presented to the student. Lectures developing broad concepts of disease processes are given by the

members of the senior staff. The emphasis is placed on etiology and pathogenesis of disease. Lectures. Prerequisites: histology and consent of instructor. 4 units. *Hackel or staff*

251. Laboratory Course in General Pathology. Laboratory session to complement Pathology 250. Gross and microscopic material is correlated with and related to disease processes. Pathology 250 may be taken concurrently. Prerequisites: histology and consent of instructor. 4 units. *Hackel or staff*

258. Cellular and Subcellular Pathology. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. The course consists of lectures and seminars discussing the alterations in cellular structure and associated functions that accompany cell injury. Prerequisite: consent of instructor. Hours to be arranged. 2 units. *Shelburne and Sommer*

275. Fundamentals of Electron Microscopy and Biological Microanalysis. Emphasis will be placed on preparative procedures including freezing techniques and on the application of electron microscopy to ultrastructural pathology. Scanning electron microscopy, X-ray microanalysis, and scanning ion microscopy will be discussed in addition to conventional transmission electron microscopy. Limited laboratory experience included. 3 units. *Shelburne, Sommer, Ingram, and Brody*

325. Cardiovascular Pathology. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic, and physiologic features, and utilizing case material and gross specimens. Consideration will be given to principles of electrocardiography. Prerequisite: consent of instructor. 3 units. *Hackel*

353. Advanced Neuropathology. This course deals with current problems and research methods related to diseases which affect the nervous system. Prerequisite: consent of instructor. 3 units. *Vogel*

355. Graduate Seminar in Pathology. Discussions outlining the scope of modern pathology. This will include reports of original researchers by members of staff and visitors. 1 unit. *Bigner and staff*

357. Research in Pathology. Independent research projects in various fields of pathology. Hours and credit to be arranged. *Jennings and staff*

361, 362. Autopsy Pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease. Emphasis is on individual work in the laboratory with tutorial supervision. Gross dissection; histologic examination; processing; analyzing of morphologic, microbiologic, and biochemical data; and interpretation of results. For advanced students. Prerequisites: Pathology 250 and consent of instructor. 3 to 6 units each. *Adams and staff*

364. Systemic Pathology. Systematic presentation of the characteristics of disease processes as they affect specific organ systems. Prerequisite: consent of instructor. 6 units. *Hackel and staff*

367. Special Topics in Pathology. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Hours to be arranged. 2 to 4 units. *Jennings and staff*

369. Ophthalmic Pathology. This course will consist of lectures, seminars, and laboratory sessions. The normal anatomy and embryology of the eye will be reviewed as a basis for the study of the various ocular disease processes. The more common diseases of the eye will be considered in detail. Problems in ophthalmic pathology will be discussed together with methods of solving them. 3 units. *Klintworth*

370. Developmental Pathology and Teratology. A systematic study of disease processes involving the prenatal, natal, and postnatal period. Emphasis will be placed

on developmental anatomy and teratogenesis. The format includes seminars and clinicopathologic correlations derived from gross and microscopic material. Prerequisites: Pathology 250 and anatomy and histology. 3 units. *Bradford*

374. Pulmonary Pathology and Postmortem Pathophysiology. Emphasis will be on pulmonary pathology and pathophysiology of infectious, metabolic, environmental, and neoplastic diseases, and certain diseases of unknown etiology (e.g., sarcoid, alveolar proteinosis). Ventilatory experiments will be done on excised human lungs. 3 units. *Pratt*

377. Pathology of the Kidney. The course includes a comprehensive study of pathological, immunological, and clinical features of the glomerulonephritis, and pyelonephritis, as well as of metabolic, congenital, and neoplastic renal disorders. Lectures will be supplemented with gross and microscopic specimens, demonstrations, and special library studies. 3 units. *Sanfilippo*

380. Diagnostic Immunology. Diagnostic and laboratory procedures used in evaluating immunologic diseases: especially autoimmune, infectious, immunodeficiency, immunoproliferative, and hypersensitivity disorders. Emphasis is placed on the theoretical and practical aspects of testing procedures and their proper interpretation. Prerequisite: permission of instructor. 2 units. *Sanfilippo, Zwadyk, R. Buckley, and Snyderman*

381. Cancer Biology. Emphasis of the course will be on cellular biology of the cancer cell. The instructors will present topics on aspects of cancer research and will attempt to correlate them with the biologic and clinical behavior of specific forms of neoplasia. 2 units. *Michalopoulos and Falletta*

382. General Pathology for Toxicologists. General principles of pathology using examples from human and experimental toxicological disease. Prerequisites: courses in biochemistry, physiology, and histology (histology may be taken concurrently). 3 units. *Graham, Jennings, and pathologists from UNC and Research Triangle Park*

COURSES CURRENTLY UNSCHEDULED

360. Cytochemistry

Pharmacology

Professor Kirshner, *Chairman* (439 Nanaline H. Duke); Professor Mills, *Director of Graduate Studies* (432 Nanaline H. Duke); Professors Ellinwood, Lack, Menzel, Ottolenghi, Schanberg, Slotkin, and Wilder; Associate Professors Abou-Donia, Bjornsson, Davis, Kuhn, Nadler, Rosen, and Strauss; Assistant Professors McNamara, Strom, and Whorton; Professor Emeritus Bernheim; Adjunct Professors Cuatrecasas and Nichol; Adjunct Associate Professor Viveros; Medical Research Professor Elion; Associate Medical Research Professor W. Wilson; Assistant Medical Research Professors Bartolome, Smith, and S. Wilson

The Department of Pharmacology offers a graduate program which leads to the Ph.D. degree. Training is available in the areas of behavioral, biochemical, cardiovascular, developmental and endocrine pharmacology, neuropharmacology, and toxicology. Because pharmacology is an interdisciplinary field, the department gives serious consideration to applicants with strong undergraduate backgrounds in biological, chemical, and neural or behavioral sciences. There is no foreign language requirement.

For Seniors and Graduates

200. Pharmacology: Mode Action of Drugs. Studies and discussion of the pharmacological action of drugs in terms of biochemical and physiological processes. Four lectures, one clinical correlation, and two conferences per week. 5 units. *Staff*

210, 211. Individual Study and Research. Directed reading and research in pharmacology. Prerequisite: consent of Director of Graduate Studies. 3 to 9 units each. *Staff*

219. Tutorial in Pharmacology. Guided independent study of original literature. Credit to be arranged. *Staff*

256. Human Nutrition. Nutrition principles with emphasis on physiology and pharmacology. Topics include the chemical basis for nutrient requirements, application to practical diets; parenteral nutrition; influence of dietary intake on disease (cardiovascular disease, diabetes, and inborn errors of metabolism); optimal dietary intake; impact of food technology on human nutrition, growth, maturation, and lactation; and recent advances in micronutrient requirements. 2 units. *Menzel*

280. Student Seminar in Pharmacology. Preparation and presentation of seminars to students and faculty on topics of broad interest to pharmacology. Required of all pharmacology graduate students. 2 units. *Whorton*

For Graduates

302. Introduction to Biostatistical Methods. Elementary statistical procedures having special application to biological research. Special emphasis on the interpretation of parameters and the appropriateness of assumptions in the biological/laboratory setting. Prerequisite: elementary mathematics including college algebra. C-L: Microbiology and Immunology 234. 3 units. *Dawson*

314. Integrated Case Studies in Toxicology. Students are assigned topics relative to their chosen research discipline in toxicology and are asked to develop case studies to present at a roundtable workshop. Emphasis on review and analysis of toxicological problems from a holistic (multidisciplinary) viewpoint. C-L: Forestry and Environmental Studies 314. Spring. 1 unit. *Abou-Donia*

330. Pharmacological Basis of Clinical Medicine. Detailed analysis of the mechanisms of action and rationale for use of pharmacologic agents in disease states. 4 units. *Bjornsson and staff*

331. Laboratory Methods in Pharmacology. Tutorial laboratory training in various fields of pharmacology including neuropharmacology, cardiovascular pharmacology, biochemical pharmacology, and biophysical pharmacology. Prerequisite: consent of instructor. 3 to 6 units. *Staff*

333. Principles of Pharmacology and Toxicology I. Drug absorption, distribution, excretion and metabolism, drug and hormone receptors and target cell responses, basic and clinical pharmacokinetics, Hansch correlation of structure and activity, stereochemistry, and drug action. May be taken separately from Pharmacology 334. 4 units. *Slotkin and staff*

334. Principles of Pharmacology and Toxicology II. Cellular actions of drugs and toxic substances, mechanisms of toxicity and antidoting, adverse drug reactions and interactions, behavioral techniques in pharmacology, statistical methods, drug development. Prerequisite: Pharmacology 333 or permission of instructor. 4 units. *Rosen, Slotkin, and staff*

347, 348. Seminar in Toxicology. C-L: Biochemistry 347, 348. 1 unit per semester. *Lynn and Abou-Donia*

354. Mammalian Toxicology. Principles of toxicology as related to humans. Emphasis on the molecular basis for toxicity of chemical and physical agents. Subjects include metabolism and toxicokinetics, toxicologic evaluation, pesticides, metals and industrial chemicals, solvent toxicity, food additives, natural toxins, radiation and radioactive materials; mutagenicity, pathology, carcinogenicity, immunology, teratogenicity; reproductive system, pulmonary, liver, kidney, eye, blood, behavioral cardio- and neurotoxicology; management of poisoning, epidemiology, risk assessment and regulatory toxicology. Taught in alternate years in the spring semester. 4 units. *Abou-Donia and staff*

360. Neuropharmacology. Seminar-lecture course emphasizing neurotransmitter mechanisms and the mechanisms of action of drugs used to modify nervous system function. Material will be drawn from recent literature. Prerequisite: Physiology 270 or consent of instructor. 3 units. *Nadler*

364. Neurotoxicology. Adverse effects of drugs and toxicants on the central and peripheral nervous system; target sites and pathophysiology aspects of neurotoxicity; factors affecting neurotoxicity, screening and assessment of neurotoxicity in humans; experimental methodology for detection and screening of chemicals for neurotoxicity. 3 units. *Abou-Donia and staff*

370. Neurobiology I. Interdisciplinary approach to neuronal function at the cellular and molecular levels. Topics will include subcellular structural organization, physiology and pharmacology of excitable membranes, impulse generation and conduction, neurotransmitters, proteins, pre- and postsynaptic organization and function. C-L: Anatomy 370 and Physiology 370. 3 units. *Kirshner and staff*

372. Research in Pharmacology. Laboratory investigation in various areas of pharmacology. Credit to be arranged. *Staff*

417. Cellular Endocrinology. Current concepts of the mechanisms of action of hormones at the cellular level, including hormone-receptor interactions, secondary messenger, regulation of protein synthesis, growth and differentiation, control of salt and water balance, regulation of substrate storage and mobilization, modulation of hormone secretion. C-L: Physiology 417. 2 units. *Caron, N. Anderson, Padilla, and guest faculties*

COURSES CURRENTLY UNSCHEDULED

260S. Interactions of Differentiated Cells

301. Physical Chemistry of Aqueous Solutions

Philosophy

Professor Golding, *Chairman* (201K West Duke); Associate Professor Posy, *Director of Graduate Studies* (201C West Duke); Professors Mahoney, Peach, and Sanford; Patterson Visiting Professor Dretske; Associate Professors Brandon and Roberts; Assistant Professors Ferejohn and Jackson; Professor Emeritus Welsh

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may, after taking a balanced program, specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophy of mind, philosophical analysis, ethics, aesthetics, political philosophy, philosophy of law, philosophy of medicine, and philosophy of religion.

Individual programs of study are developed for each student. The following requirement, however, is fundamental: the preliminary examination for the Ph.D., which

may be taken only after a student has met the language requirement for that degree, should be taken after the second year of study. In these examinations students are expected to combine historical knowledge with critical understanding.

Work in a minor or related field, not necessarily confined to any one department, is encouraged but not required. A minor normally includes 6 units for the A.M. or the Ph.D. degree and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School may earn the A.M. degree in philosophy by passing an oral master's examination. This examination, which can be the defense of either a master's thesis or an alternative academic exercise approved by the department and the student's committee, is normally given in the student's fourth term of full-time registration. The examination can be given earlier in two special circumstances:

1. A student with a strong undergraduate background in philosophy who satisfies the department of his or her qualifications by submitting several samples of written work before beginning the program may be admitted to the master's program with the understanding that the master's examination can be given in the second or third term of full-time registration.

2. A student who combines the A.M. program in philosophy with another advanced degree program, such as the programs for the J.D., the M.D., or the Ph.D. in another field, will register as a full-time graduate student of philosophy for only two terms, the minimum registration that meets the general requirements of the Graduate School for the A.M. degree. These two terms of full-time registration need not be consecutive, and their position in the student's overall program is determined in individual cases. A student in a combined program will normally do some work in philosophy while registered in the student's primary program and do some work in the primary field while registered in philosophy. The master's examination can be given in the second term of full-time registration as a philosophy graduate student or in a later term when the student is registered in the primary program.

A student in the philosophy Ph.D. program who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing the preliminary for the Ph.D. degree.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. Students may not take their preliminary examinations until they have demonstrated this ability. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

For Seniors and Graduates

203S. Contemporary Ethical Theories. The nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth-century British and American philosophers. 3 units. *Golding or Jackson*

204S. Philosophy of Law. Natural law theory and positivism, the idea of obligation (legal, political, social, moral), and the relation of law and morality. 3 units. *Golding*

205S. Philosophy of History. Nature of historical knowledge and inquiry; theories of the historical process. 3 units. *Roberts*

206S. Responsibility. The relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. 3 units. *Golding*

208S. Political Values. Analysis of the systematic justification of political principles and the political values in the administration of law. 3 units. *Golding or Jackson*

211S. Plato. Selected dialogues. 3 units. *Ferejohn*

217S. Aristotle. Selected topics. 3 units. *Ferejohn*

218S. Medieval Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. 3 units. *Mahoney*

219S. Late Medieval and Renaissance Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. 3 units. *Mahoney*

225S. British Empiricism. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. 3 units. *Peach*

227S. Continental Rationalism. A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. 3 units. *Peach*

228S. Recent and Contemporary Philosophy. A critical study of some contemporary movements, with special emphasis on analytic philosophers. 3 units. *Posy*

230S. The Meaning of Religious Language. C-L: Religion 230S. 3 units. *Poteat*

231S. Kant's Critique of Pure Reason. 3 units. *Posy*

233S. Methodology of the Empirical Sciences. Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, probability and induction, and other topics. Prerequisite: consent of instructor. 3 units. *Brandon*

234S. Problems in the Philosophy of Science. Selected problems in the physical and nonphysical sciences such as space and time, measurement and determinism. Prerequisite: consent of instructor. 3 units. *Brandon*

235S. Hegel and Marx. Hegel's philosophy and its influence on Marx. 3 units. *Staff*

251S. Epistemology. Selected topics in the theory of knowledge, for example, conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. 3 units. *Sanford*

252S. Metaphysics. Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. 3 units. *Sanford*

253S. Philosophy of Mind. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons, and personal identity. 3 units. *Dretske or Sanford*

254S. Philosophy of Religion. Topics such as proofs of the existence of God; meaningfulness of religious language; the problems of evil, immortality, and resurrection. 3 units. *Roberts*

291S, 292S. Special Fields of Philosophy. 3 units each. *Staff*

For Graduates

311. Philosophy and Medicine. The scope of medicine as a philosophical problem, the concept of health, and investigation of ethical issues arising in medical contexts. Prerequisite: consent of instructor. 3 units. *Golding*

331, 332. Seminar in Special Fields of Philosophy. 3 units each. *Staff*

COURSES CURRENTLY UNSCHEDULED

202S. Aesthetics: The Philosophy of Art

232S. Recent Continental Philosophy

Physical Therapy

Professor Bartlett, *Chairman* (045 Hospital); Associate Professor Branch, *Director of Graduate Studies* (045 Hospital); Associate Professor Villanueva; Assistant Professors Duncan and Horton; Assistant Clinical Professors Eckel and Riordan

The Department of Physical Therapy offers an entry level professional program leading to the M.S. degree. To be eligible for admission to the program, applicants must have obtained a baccalaureate degree and have a background in the basic sciences and social sciences, including course work in biology, chemistry, physics, and psychology.

The program is designed to provide for integration of classroom knowledge and clinical learning experiences essential for the competent practice of physical therapy. In view of this integrated curriculum, failure in a major course within a semester would prevent the student from continuing in the program. Major courses are all courses offered by the Department of Physical Therapy as well as required courses offered by the Department of Anatomy. A grade of *F* (or *noncredit* in the case of Physical Therapy 342, 343, and 344) in any of these courses will occasion withdrawal from the program. Program requirements also include a comprehensive examination, at the completion of the curriculum, and a research project. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3965, Duke University Medical Center, Durham, North Carolina 27710.

210. Independent Study. Designed for nonmajors. Prerequisite: consent of instructor. Credit to be arranged. *Staff*

301. Introduction to Scientific Inquiry. Theory and methods of research process, research design, data collection, statistical techniques, introductory computer training. 2 units. *Staff*

302. Research. Development of a research project protocol. 1 unit. *Staff*

303. Research. Completion of research project under the supervision of a faculty adviser; guidance in the use of the computer for statistical analysis. 3-6 units. *Staff*

304. Seminar in Applied Neurophysiology. Selected topics in neurophysiology, with emphasis on those most relevant to the theory and practice of physical therapy. 1 unit. *Staff*

313. Physical Agents. Physical aspects and physiological effects of selected physical agents, including massage, superficial heat and cold, ultraviolet, ultrasound, high and low frequency electrical currents. 2 units. *Branch and Eckel*

317. Kinesiology. Fundamentals of arthrology and myology, movement and joint description, surface anatomy, principles of biomechanics and anthropometry. 2 units. *Villanueva*

318. Arthrology and Pathokinesiology. Detailed study of the arthrology and kinesiology of the trunk and limbs during normal and pathological conditions, with emphasis on the sequential electromyographic and joint motion analysis of body segments during selected human movement patterns, including locomotion. 3 units. *Villanueva*

319. Introduction to Evaluation and Patient Care. Orientation to basic patient care skills, including reaction to illness. Introduction to Problem-Oriented Record System. Principles and methods of gross evaluation, including assessment of muscle function, joint mobility, neurological and respiratory function, posture, gait, and physical level of independence. Opportunities for direct patient care in laboratory and clinic. 2 units. *Eckel, Horton, and Villanueva*

320. Evaluation and Therapeutic Procedures I. Specific assessment of neuromuscular and cardiopulmonary functions. Physiological basis of therapeutic intervention and specific exercise programs. Electrodiagnostic testing, introduction to electromyography and nerve conduction studies, and principles and application of biofeedback. 4 units. *Duncan, Horton, and staff*

321. Evaluation and Therapeutic Procedures II. Assessment and treatment of specific neuromuscular and cardiopulmonary problems. Introduction to techniques of neuromuscular facilitation. 2 units. *Duncan and staff*

322. Evaluation and Therapeutic Procedures III. Description and observation of the development of the normal child, followed by the discussion of various pediatric problems. Introduction to the neurophysiological basis for the evaluation and treatment of children and adults with central nervous system disorders; emphasis on assessment of abnormal movement and selection of appropriate therapeutic programs. Problems associated with spinal cord injuries, methods of therapeutic intervention, and functional training. 3 units. *Bartlett, Duncan, and Eckel*

332. Physical Therapy and Health Services: Administration and Issues. Planning, organizing, delivering, and evaluating physical therapy and health services. Examination of health policy and issues. Principles of administration, leadership styles, and management roles. 3 units. *Bartlett and Riordan*

334. Introductory Pathology. A review of normal cells and tissues; fundamentals of pathology with emphasis on broad concepts of disease. 2 units. *Branch*

336. Medical Sciences. The clinical manifestations and management of common medical and surgical disorders. Lectures by physicians, physical therapists, clinical pharmacists, and other health personnel; selected laboratory experiences. Areas covered include orthopaedics, prosthetics and orthotics, burns, rheumatology, cardiopulmonary disorders, neurology, neurosurgery, hematology, and gerontology. Seminars in patient management. 5 units. *Branch and staff*

340. Special Topics in Physical Therapy. Opportunity for study under the direction of an individual staff member. Prerequisite: consent of Director of Graduate Studies. Credit to be arranged. *Staff*

342. Directed Clinical Experience in Physical Therapy I. Short-term observational and supervised learning experiences in local physical therapy settings. 1 unit. *Eckel and clinical staffs*

343. Directed Clinical Experience in Physical Therapy II. Full-time supervised clinical learning experiences in physical therapy settings within limited radius of the University. 2 units. *Eckel and clinical staffs*

344. Directed Clinical Experience in Physical Therapy III. Full-time supervised clinical learning experiences in physical therapy settings throughout the country. 3 units. *Eckel and clinical staffs*

COURSES CURRENTLY UNSCHEDULED

324. Prosthetics and Orthotics

Physics

Professor Lewis, *Chairman* (118 Physics); Professor Fairbank, *Director of Graduate Studies* (112 Physics); Professors Biedenharn, Bilpuch, Cusson, De Lucia, Evans, Goshaw, Han, Meyer, Roberson, Robinson, Walker, Walter, and Weller; Associate Professors Fortney, Herbst, and Palmer; Assistant Professors Behringer and Oh; Adjunct Professors Ciftan, O'Foghlu, Robl, and Way

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields in which research is being done by faculty and staff.

With the help of faculty advisers, students select a course program to fit their needs, including work in a related field, usually mathematics or chemistry. Students are encouraged to begin research work early in their careers.

For Seniors and Graduates

211. Modern Physics. Fundamental concepts of quantum theory applied mainly to study of atomic structure and spectra, and to statistical physics. Prerequisites: Physics 181 and Mathematics 111. 3 units. *Herbst*

214. Introduction to Solid-State Physics. C-L: Electrical Engineering 214. 3 units. *Hacker or staff*

215. Introduction to Quantum Mechanics. Fundamental postulates; wave mechanics and elementary applications; operators, eigenvalues, and eigenfunctions; angular momentum and rotations; spin and coupling of angular momenta; perturbation theory, transition rates, and selection rules; identical particles; applications. Prerequisites: Physics 181 and 211; Mathematics 111 and 114 (may be taken concurrently). 3 units. *Robinson*

217S, 218S. Advanced Physics Laboratory and Seminar. Experiments involving the fields of electricity, magnetism, heat, optics, and modern physics. 6 units. *Meyer*

220. Electronics. Basic elements of modern electronics including AC circuits, transfer functions, solid-state service, transistor circuits, operational amplifier applications, digital circuits, and computer interfaces. 3 units. *Fortney*

240. Computer Applications to Physical Measurement. Hardware and software techniques for computer-assisted data acquisition, display, and control in the modern experimental environment. Theory and application of discrete signal analysis including digital filters, Z-transform, and fast Fourier transform. Lecture and laboratory. Prerequisite: Physics 171 or 220 or consent of instructor. 3 units. *Fortney*

For Graduates

302. Advanced Mechanics. The fundamental principles of Newtonian mechanics, general dynamics of systems of particles and rigid bodies, the methods of Lagrange and Hamilton, generalized mechanics. 3 units. *Han*

303. Statistical Mechanics. Fundamental laws of thermodynamics and statistical mechanics with applications to physics and chemistry. Classical and quantum ideal gases; approximate methods for real gases and liquids. Prerequisite: Physics 212 or 215. 3 units. *Behringer*

304. Advanced Topics in Statistical Mechanics.* This course will vary from year to year. Possible topics include Fermi liquids, systems of bosons, many-body theory, nonequilibrium statistical mechanics. Prerequisites: Physics 303 and 316. 3 units. *Staff*

305. Introduction to Nuclear Physics. Phenomenological aspects of nuclear physics, interaction of gamma radiation and charged particles with matter, nuclear detectors, particle accelerators, radioactivity, basic properties of nuclei, nuclear systematics, nuclear reactions, particle scattering, nuclear models of the deuteron, nuclear forces, parity. 3 units. *Weller*

*Offered on demand.

308. Introduction to High-Energy Physics. High-energy processes; electromagnetic, weak, and strong interactions. Experimental instrumentation. 3 units. *Walker or Goshaw*

309. Solid-State Physics I. Properties of matter in the condensed state; crystal lattices, electrons in metals and semiconductors, band theory, nonmetallic solids, lattice dynamics, and phonons. Prerequisites: Physics 212 or 215 and 303. 3 units. *Palmer*

316. Principles of Quantum Theory. Original and fundamental concepts of quantum theory, wave and matrix mechanics, theory of measurements, exclusion principle, and electronic spin. Prerequisites: Physics 212 or 215 and 302. 3 units. *Biedenharn or Evans*

317. Intermediate Quantum Theory. General operator methods, angular momentum, Dirac electron theory. Second quantization; symmetry principles and conservation theorems. Applications to the theory of solids, of nuclei, and of elementary particles will be stressed. Prerequisite: Physics 316. 3 units. *Evans or Biedenharn*

318. Electromagnetic Field Theory. Electrodynamics, theory of wave optics, radiation of electric and magnetic multipole fields, special relativity, covariant electrodynamics, Lienard-Wiechert potentials, scattering and dispersion, Hamiltonian field equations. Prerequisite: Physics 182. 3 units. *Cusson*

331. Quantum Electronics.* Electromagnetic radiation and its interaction with matter. Lasers, nonlinear optics, submillimeter waves, detection theory, propagation. 3 units. *De Lucia*

335. Molecular Spectroscopy. Interpretation and theory of electronic, vibrational, rotational, and nuclear hyperfine states. Bound state quantum mechanics. Emphasis on small fundamental species of importance in science and technology. 3 units. *De Lucia*

342. Theory of Elementary Particles.* Theoretical methods used in treating particle interactions, emphasizing phenomenological treatments. Quantum field theory and dispersion theory is developed as needed. Applications in the general areas of pion physics, electromagnetic interactions of hadrons, strange particle interactions, and weak interactions are surveyed. Prerequisite: Physics 316. 3 units. *Han*

346. Topics in Theoretical Physics.* The content of this course will vary from year to year. General methods in quantum mechanics such as group theory and its applications, elementary particle theory, field theory, theory of solids, theoretical nuclear physics, atomic and molecular structure. Prerequisites: Physics 316 and 317. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

306. Low Temperature Physics

310. Solid-State Physics II

312. Phase Transitions and Critical Phenomena

330. Nuclear Structure Theory

341. Advanced Topics in Quantum Theory

343. Nuclear Physics

344. Advanced Nuclear Physics

345. High-Energy Physics

351, 352. Seminar

397, 398. Low Temperature and Solid-State Seminar

Physiology

Professor Johnson, *Chairman* (388 Nanaline H. Duke); Associate Professor McManus, *Director of Graduate Studies* (388 Nanaline H. Duke); Professors Blum, Diamond, Gutknecht, Jöbssis, Lauf, Lieberman, Mandel, Moore, Reynolds, Salzano, Schmidt-Nielsen, Somjen, Spach, and Tanford; Associate Professors N. Anderson, Bennett, Erickson, Greenfield, Kootsey, Kylstra, Mills, Padilla, Schomberg, Simon, and Wolbarsht; Assistant Professors P. A. W. Anderson, Camporesi, Caron, Dennis, Handwerger, Wallace, Wechsler, and Yarger; Adjunct Assistant Professors Carter and McHale; Associate Medical Research Professor Sylvia; Assistant Medical Research Professors Baumann and Hines

The Department of Physiology offers graduate work leading to the Ph.D. degree. Before undertaking this program a student should have a strong background in basic sciences including course work in mathematics, biology, physics, and chemistry through physical chemistry. Undergraduates with this background may have majors in any of the following areas: biology, chemistry, physics, mathematics, engineering, or computer sciences. There is no foreign language requirement.

For Seniors and Graduates

200. Medical Physiology. Limited to students whose training requires knowledge of human physiology as it pertains to medicine. Four lectures, one conference, and one clinical correlation per week. Open to undergraduates only with consent of course leader. Fall. 4 units. *Padilla and staff*

201. Basic Neurophysiology. A survey of neurophysiology with emphasis on medical application. Follows after Physiology 200 in a four-week period after Christmas vacation. Lectures, conferences, demonstrations, clinical presentations. Concurrent enrollment in Neuroanatomy is encouraged. Prerequisite: Physiology 200 or equivalent. Spring. 2 units. *Somjen and staff*

204. Introduction to Modern Physiology. Flow of fluids in tubes, ion transport mechanisms, and endocrine systems are examined in terms of how such processes enter into the functioning of intact organs such as heart, lung, gut, and central nervous system. Particular emphasis is given to the control of physiological function both at the cellular and higher levels of organization. Required of all graduate students in physiology. Others must have consent of instructor. Prerequisites: at least one year each of physics and calculus and biology; chemistry through organic chemistry; physical chemistry is strongly recommended. Spring. 4 units. *Blum and staff*

208. Respiratory System in Health and Disease. Primary emphasis on the physiology of respiration. Topics include pulmonary mechanics; gas exchange; ventilation-perfusion relationships; central and peripheral regulation of ventilation and respiratory responses to exercise, altitude, and hyperbaric environments. Prerequisite: consent of instructor. Spring. 2 units. *Salzano and Kylstra*

210. Individual Study. Directed reading and research in physiology. Prerequisite: consent of Director of Graduate Studies. 3 to 9 units each. *Staff*

217. Membrane Transport. Basic principles of the transport of water and solutes across biological and model membranes. The course uses physicochemical principles to provide a comprehensive understanding of phenomena such as active and passive transport, energy barriers through membranes, surface effects, and ion selectivity. The methodology and conceptual framework for the study of transport is described with selected examples from bilayers, red blood cells, nerve, and epithelia. Physical

chemistry is recommended. Prerequisite: consent of instructor. Spring. 3 units. *Mandel*

219S. Seminar in Membrane Physiology. Offered at Beaufort. Fall. 2 units. *Gutknecht*

230. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Pathology 219. Fall. 3 units. *Padilla and staff*

272S. Physiology of the Central Nervous System. Prerequisites: Physiology 200 and 201 (or equivalents), and some knowledge of neuroanatomy; for undergraduates, consent of instructor. C-L: Psychology 272S. Spring. 2 or 3 units. *Somjen and staff*

280. Student Seminar in Physiology. Preparation and presentation of seminars to students and faculty on topics of broad interest to physiology. Required of all physiology students. 2 units. *Simon*

For Graduates

320. Gastrointestinal Physiology. The normal physiology, mechanisms of control, and transport characteristics of the gastrointestinal tract and its associated glands and organs (salivary, pancreas, liver) are presented. The mechanisms of secretion, reabsorption, and motility are treated at a cellular level. Numerous pathophysiological examples are presented and their clinical implications are emphasized. Spring. 2 units. *Mandel, Akwari, and staff*

321. Renal Physiology. Basic renal mechanisms involved in the elaboration of urine including concentrating and diluting mechanisms, hemodynamics, and regulation of acid-base balance. Both basic physiological processes and pathophysiological alterations will be considered. Spring. 2 units. *Dennis and staff*

370. Neurobiology I. C-L: Pharmacology 370 and Anatomy 370. Taught in alternate years in the fall semester. 3 units. *Kirshner and staff*

372. Research in Physiology. Laboratory investigation in various areas of physiology. Credit to be arranged. *Staff*

390. Membrane Biology. Various aspects of cell membranes and membrane proteins and lipids. Specific topics are chosen based on student interest and current literature discussed. Prerequisite: consent of instructor. Spring. 2 units. *Reynolds*

401. Metabolic Physiology. The control of gluconeogenesis, protein degradation, the storage and mobilization of glycogen and of lipids will be examined both at cellular level (e.g., metabolic compartmentation, futile cycling, enzyme modification) and in terms of interactions between tissues such as liver, kidney, and muscle. Strategies for metabolic adaptation to exercise, cold environment, starvation, obesity, and birth will be discussed. Prerequisites: Physiology 204 and one year of biochemistry. Taught in alternate years in the fall semester. 3 units. *Blum*

417. Cellular Endocrinology. Current concepts of the mechanisms of action of hormones at the cellular level, including hormone-receptor interactions, secondary messenger systems for hormones, mechanisms of regulation of hormone responsiveness, regulation of growth, differentiation and proliferation, cellular and electrophysiological mechanisms of secretory stimulus sensing and transduction, systems approach to feedback regulation and information transfer in an endocrine system. Lectures by local and outside clinical faculty will stress the clinical correlation of the basic concepts elaborated in the course. Students will be expected to participate in one seminar presentation. C-L: Pharmacology 417. Fall. 2 units. *Caron, N. Anderson, Padilla and guest faculties*

418. Reproductive Biology. An in-depth study of male and female reproductive processes including hypothalamic, pituitary, and gonadal control mechanisms, as well as the physiology of pregnancy and parturition. Lectures by guest clinical faculty will emphasize the interface between basic science and clinical aspects. The lecture material in each section of the course is followed by seminar presentations which will contribute to Physiology 424, a corequisite for the course. C-L: Anatomy 418. Spring. 2 units. *Schomberg, N. Anderson, and Tyrey*

424. Seminar in Reproductive Biology. Selected topics in reproductive biology will be chosen for in-depth reading and analysis in the seminar format. Can be taken independently or corequisite with Physiology 418. C-L: Anatomy 424. Spring. 1 unit. *Schomberg, N. Anderson, and Tyrey*

COURSES CURRENTLY UNSCHEDULED

203. Introduction to Biophysics and Biophysical Chemistry

207. The Heart in Health and Disease

281. Teaching in Physiology

301. Oxygen and Physiological Function

302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

362. Cardiac Muscle Physiology

383. Physiological Instrumentation

416. Biophysics of Excitable Membranes

419. Topics in Mathematical Physiology

420. Cellular Immunophysiology

Political Science

Professor Kornberg, *Chairman* (214 Perkins); Associate Professor Lange, *Director of Graduate Studies* (331 Perkins); Professors Ascher, Barber, Braibanti, Cleaveland, Fish, Hall, Holsti, Horowitz, Hough, Leach, Paletz, Price, Spragens, and Valenzuela; Associate Professors Eldridge, Johns, and McKean; Assistant Professors Entman, Gillespie, Grieco, Hoadley, Kitschelt, Lomperis, and Roberts; Professors Emeriti Ball, Cole, Grzybowski, Hallowell, Kulski, and Simpson; Adjunct Associate Professor O'Barr

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant must have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science. Instruction is currently offered in the following fields: American government and politics, comparative government and politics, political theory, and international relations.

The candidate for the degree of Doctor of Philosophy in political science must take at least sixteen courses in all, including twelve in the department, and demonstrate competence in at least two general fields of the discipline as well as in a third general field or in a specialized subfield or in a field external to the department. The candidate must also demonstrate a reading knowledge of two foreign languages or must demonstrate proficiency in one foreign language and in the use of statistics.

The terminal degree of Master of Arts, for those who do not intend to continue with doctoral studies, is awarded following successful completion of: (1) eight one-

semester courses of 3 units each, at least half of which must be in political science; and (2) the A.M. thesis. In addition, candidates for the A.M. degree must demonstrate competence in one foreign language or in statistics.

Further details on the graduate program in political science, the departmental facilities, the staff, and available financial aid may be obtained from the Director of Graduate Studies, Department of Political Science.

For Seniors and Graduates

201S. Problems in International Security. Major security issues. Prerequisite: a course in international relations or foreign policy. 3 units. *Staff*

203S. Politics and the Media of Mass Communication. Analysis of crucial aspects of the media-politics relationship. Media's effects on political socialization, public opinion, political participation, pluralism, power, and authority. Government's impact on the media. Prerequisite: consent of instructor. 3 units. *Paletz*

204S. Ethics in Political Life. Ethical issues arising in the conduct of political vocations and activities. C-L: Public Policy Studies 204S. 3 units. *Spragens*

207S. American Constitutional Interpretation. Development of the Constitution of the United States through Supreme Court decisions. 3 units. *Fish*

208S. Analyzing the News. C-L: Public Policy Studies 240S. 3 units. *Entman*

209. Problems in State Government and Politics. 3 units. *Leach*

211S. Current Problems and Issues in Japanese Politics. Sources of strength and weakness in the Japanese economy, the rise of new issues and strains in postindustrial society, changes in the party system and decision-making process, the possible transfer of power, the challenge of Japan's new world role. 3 units. *McKean*

213S. Theories of International Political Economy. Comparison and assessment of traditional and modern theories in terms of their logical and empirical validity. 3 units. *Grieco*

214S. The Politics of Scarcity. Issues in politics, economics, ethics, and policy associated with conflicts arising from long-term scarcity in crucial resources. 3 units. *McKean*

218S, 219S. Political Thought in the United States. 218S: the Founders and their European and Puritan antecedents; debates over slavery and the Union. 219S: topics in late nineteenth and twentieth-century thought. 6 units. *Price*

220S. Problems in International Politics. Prerequisite: one course on international relations or foreign policy or diplomatic history. 3 units. *Holsti or Hough*

223. Ancient Political Philosophy. Intensive analysis of the political philosophy of Plato, Aristotle, and other ancient theorists. 3 units. *Gillespie*

224S. Modern Political Theory. A historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. The rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. 3 units. *Spragens*

225. Topics in Comparative Government and Politics: Western Europe. Topics vary: the development of mass democracy and the welfare state; political and electoral participation and mobilization; social movements and political change; center-periphery conflicts; government and bureaucratic institutions and their relationships to society; the modern welfare state and political economy. 3 units. *Kitschelt or Lange*

226S. Theories of International Relations. An overview with applications to political-military and political-economic empirical problems. 3 units. *Grieco*

227. International Law. Theory and practice of international law: rights and duties of states with respect to recognition, state territory and jurisdiction, treaties, settlement of disputes, and other topics. 3 units. *Pye*

228S. Nineteenth- and Twentieth-Century Political Philosophy. Topics in nineteenth- and twentieth-century political philosophy, considering such authors as Hegel, Marx, Nietzsche, Dostoevski, Heidegger, Malraux, and Camus. 3 units. *Gillespie*

229S. Contemporary Theory of Liberal Democracy. Reading of major works and discussion of current issues in contemporary liberal and democratic theory. 3 units. *Spragens*

232. Political Economy: Theory and Applications to Western Europe. This course will explore some basic theories of political economy at the individual, organizational and societal levels, drawing from Western Europe. Specific substantive topics will vary. 3 units. *Lange*

233S. Quantitative Political Analysis II. Intermediate statistical methods, especially linear regression, for political science research. Emphasis on assumptions and interpretations of results. Prerequisite: Political Science 138 or 236 or equivalent. 3 units. *Hoadley*

234S. Political Economy of Development: Theories of Change in the Third World. Alternative approaches to political, economic, and social change in Latin America, Africa, and Asia. C-L: Anthropology 234S, History 234S, and Sociology 234S. 3 units. *Bergquist, Fox, Gereffi, Smith, and Valenzuela*

235S. Comparative Development of Islam. Comparative development of Islam in Indonesia, Malaysia, Pakistan, India, North Africa, and sub-Saharan Africa. A comparative analysis of the resurgence of Islam as a religious, political, and cultural force. 3 units. *Braibanti*

236. Statistical Analysis. Introduction to statistics in political research, emphasizing research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or who are enrolled in Political Science 138, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 122, or Sociology 132 or 293. 3 units. *Hoadley*

237S. Comparative Public Policy. Introduction to methods, concepts, and theories of comparative public policy analysis. Substantive policies examined in the course vary each semester and may include economic, industrial, social and civil rights policies. 3 units. *Kitschelt*

240. American Political Behavior. 3 units. *Staff*

242S. Comparative Law and Policy: Ethnic Group Relations. C-L: Public Policy Studies 242S and Law 572. 3 units. *Horowitz*

245. Ethics and Policy Making. C-L: Public Policy Studies 223. 3 units. *Price*

248. The Politics of the Policy Process. C-L: Public Policy Studies 219. 3 units. *Staff*

249. Comparative International Development and Technology Flow. Theoretical analysis of social, political, and economic development in Third World countries. The internal problem of maintaining political systems and the external problem of adapting intermediate or appropriate technologies. 3 units. *Braibanti*

251S. The American Presidency. The Presidency and its impact on the American political system. 3 units. *Paletz*

253S. Comparative Government and the Study of Latin America. Current literature on major themes of Latin American politics. 3 units. *Valenzuela*

255. Political Sociology. C-L: Sociology 255. 3 units. *Smith, Stark, or Tiryakian*

256S. Arms Control and National Security Policy. The evolution of nuclear weapons and strategy and of global defense policy toward the Soviet Union and other adversaries; the arms control process and nonproliferation. Prerequisite: consent of instructor. 3 units. *Lomperis*

259S. Low Intensity Conflict and the Lessons of Viet Nam. The Viet Nam conflict and comparative cases; implications for Western interventions in the Third World. Prerequisite: consent of instructor. 3 units. *Lomperis*

260. The Tradition of Political Inquiry. Past and present problems, goals, pre-suppositions, and methods. 3 units. *Spragens*

261. Politics and the Future. The projection of possible political orders: the effects of changing resources, technologies, and values on mankind's ability to govern. 3 units. *Lomperis*

262S. International Communism. 3 units. *Hough*

263S. Methods of Political Science. The relation between theory and evidence; research designs for the comparative analyses of historical and statistical evidence. 3 units. *Roberts*

264. The President and the Federal Bureaucracy. Presidential management of the executive branch, including the development of the modern institutional presidency; an analysis of bureaucratic politics, its causes and effects; and an examination of executive-legislative relations in managing the bureaucracy. 3 units. *Cleaveland*

267S. Policy Making in International Organizations. C-L: Public Policy Studies 267S. 3 units. *Ascher*

275. The American Party System. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. 3 units. *Kornberg*

277. Comparative Party Politics. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. 3 units. *Kornberg or Lange*

282S. Canada. Topics vary each semester and may include nationalism in Canada, Canadian defense policies, Canadian-American relations, regionalism in Canada, environmental issues, and others. C-L: Anthropology 282S, History 282S, and Sociology 282S. 3 units. *Leach*

283S. Congressional Policy Making. Lawmaking and oversight of the executive branch by the United States Congress. Committee, party, executive, and interest group roles. C-L: Public Policy Studies 283S. 3 units. *Price*

284S. Public Policy Process in Developing Countries. C-L: Public Policy Studies 284S. 3 units. *Ascher*

286S. Judicial Administration. Organization, case processing, and management of courts with emphasis on federal appellate courts. Prerequisite: Political Science 127. 3 units. *Fish*

293. Federalism. Theoretical and operational aspects of federal systems of government, focusing on the United States and Canada. 3 units. *Leach*

For Graduates

303. Seminar on Statistics. Application of advanced statistical methods to political science research problems. Primary focus on multiple regression procedures. Em-

phasis on assumptions, interpretation of results, and use of the computer. Prerequisite: Political Science 236 or consent of instructor. 3 units. *Hoadley*

305. Seminar in U.S. Foreign Policy. Decision making in American foreign policy. The sources, substance, and consequences of U.S. policy will be examined. The emphasis is on the period since 1945. 3 units. *Holsti*

308. Individual Research. Students will conduct research designed to evaluate hypotheses of their choice. Reports on the research must be presented in appropriate professional style. 3 units. *Staff*

309. Seminar in International Relations. Critical survey of theories and research in international relations and foreign policy. Emphasis will be placed on the interrelation between theory and research. 3 units. *Holsti*

321. Seminar in Political Theory. Prerequisites: 6 units in political science elected from 223, 224, 229, 231, or their equivalents. 3 units. *Spragens*

325. Seminar in Comparative Government and Politics. 3 units. *Staff*

326. Research Seminar in Comparative Government and Politics. Seminar in major issues in comparative politics and intensive individual student research projects. 3 units. *Staff*

340. Seminar in American Politics and Institutions. Survey, analysis, and critique of the literature. 3 units. *Hoadley or Paletz*

381. Research Seminar in Latin American Government and Politics. Prerequisite: Political Science 253 or equivalent. 3 units. *Valenzuela*

COURSES CURRENTLY UNSCHEDULED

280S. Comparative Government and Politics: Sub-Saharan Africa

360. Seminar in Government and Politics in the Soviet Union

RELATED COURSE WORK IN THE SCHOOL OF LAW

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to in this bulletin under the section on academic regulations in the chapter "Registration and Regulations."

Psychology

Professor Carson, *Chairman* (224 Psychology-Sociology); Associate Professor Eckerman, *Director of Graduate Studies* (225 Psychology-Sociology); Professors Alexander, Bevan, Borstelmann, Coie, Costanzo, Diamond, C. Erickson, R. Erickson, Lakin, Lockhead, H. Schiffman, Staddon, M. Wallach, and Wing; Associate Professors Casseday, Day, W. C. Hall, W. G. Hall, McConahay, Roth, and Rubin; Assistant Professors Dix, Kremen, and Putallaz; Professor Emeritus Kimble; Adjunct Professors Brodie, Campbell, and Crovitz; Lecturers Clark, Cofer, Cooper, Herman, Keefe, King, Lochman, Logue, Marsh, Page, Payne, Sawyer, S. Schiffman, Shipley, Somjen, Surwit, Thompson, L. Wallach, Williams, and Wolbarsht

The department offers graduate work leading to the Ph.D. degree. The areas of concentration are experimental, biological, cognitive, personality, developmental, and clinical. A brochure is available from the Director of Graduate Studies which describes the program in more detail and gives information on financial assistance, facilities, and current research activities.

For Seniors and Graduates

202S. Great Ideas in Psychology. Ideas in psychology drawn from various content areas (e.g., perception, personality, motivation, biological bases, social, cognitive, developmental, learning, clinical) and methodological approaches (e.g., experimental, introspection, observation, interview, longitudinal, simulation). Prerequisite: consent of instructor. 3 units. *Day*

203S. Sensation and Perception. Classical and current concepts and methods. 3 units. *Lockhead*

210S. Cognition. Cognitive psychology (attention, memory, language, and problem solving). Problems such as forms of representation, individual differences, and modes of thinking. Emphasis on alternative experimental and theoretical approaches. 3 units. *Day*

212S. Human Memory. Literature, classical and modern; data and theories relating to mechanisms of information processing, storage, and retrieval. 3 units. *Rubin*

214S. Development of Social Interaction. Major concepts and methods pertaining to early social development, emphasizing human social behavior and a developmental psychobiological approach. 3 units. *Eckerman*

215S. Cognitive Development. Major approaches to the development of knowledge, including Piaget, Thomas Kuhn, Vygotsky, Eleanor Gibson, Kohlberg, and others. 3 units. *L. Wallach*

216S. Biological Psychology. The neural basis of behavior with special emphasis on the organization and evolution of the neocortex and the dorsal thalamus. A historical approach, using original texts by LeGros Clark, Elliot Smith, Herrick, Sherrington, Cajal, Campbell, and many others. While emphasis is on the neocortical sensory systems, the structure and function of the limbic system and hypothalamus are reviewed. C-L: Anatomy 216S. 3 units. *Diamond*

217S. Social Psychology. Social factors in cognition, models of social interaction, conformity and social influence, and attitude development and change. 3 units. *Cos-tanzo*

219S. Neural Bases of Behavior. Structure and function of the nervous system as related to problems of sensory-motor processes, learning, motivation, and memory. 3 units. *R. Erickson and C. Erickson*

220S. Psycholinguistics. Selected topics such as psychological "reality" of linguistic structures, neurolinguistics, language and personality, linguistic versus pictorial representation, individual differences, oral versus written expression, and the language-thought interaction. 3 units. *Day*

230S. Social Behavior of Animals. Developmental, ecological, and physiological aspects of territorial, sexual, parental, and aggressive behavior. 3 units. *C. Erickson*

234S. Personality. Selected topics of current interest concerning empirical research on personality. Strategies for the definition of research questions and the evaluation of research progress. 3 units. *M. Wallach*

238S. Electroencephalogram and Psychological Function. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, reaction time, and attention. Emphasis on the electrophysiology of conditioning and learning. Lectures, laboratory demonstrations, and clinical case presentations. 3 units. *Marsh*

245S. Personality Theory. Representative theories of human functioning, from Freud to contemporary approaches. 3 units. *Kremen or Alexander*

266. Comparative Neurobiology. The evolution and functional organization of the vertebrate brain. A study of the original papers of the great pioneers in evolution, neuropsychology, and neuroanatomy. Prerequisite: consent of instructor. C-L: Anatomy 266. 3 units. *Diamond*

271S. A-F. Selected Problems. 3 units each. *Staff*

272S. Physiology of the Central Nervous System. Prerequisites: Physiology 200 and 201 (or equivalents), and some knowledge of neuroanatomy; for undergraduates, consent of instructor. C-L: Physiology 272S. 2 or 3 units. *Somjen and staff*

273S, 274S. Statistical Principles in Experimental Design. The problems of scientific inference; methods of data analysis and issues in experimental design. 3 units each. *Roth*

286S. Biological Basis of Hearing. Anatomy and physiology of the auditory system; neural mechanisms for localization of sound, frequency discrimination, and discrimination of temporal patterns of sound such as speech; disorders of hearing. 3 units. *Casseday*

295S. Group Psychotherapy and Processes. Past and current trends in group intervention techniques. Field observations. 3 units. *Lakin*

For Graduates

305. Psychopathology. An examination of behavior disorders, with particular emphasis on explanatory concepts and the evidence from research in this field. 3 units. *Carson*

307. Introduction to Methods in Psychotherapy. Current trends in psychotherapeutic practice and research. Application of principles drawn from theories of personality to individual and group psychotherapy. 3 units. *Carson or Lakin*

309. Seminar in Learning. Selected topics in operant conditioning and discrimination learning. 3 units. *Staddon*

310. Seminar in Perception. 3 units. *Lockhead*

318. Methods of Inquiry. Examination of relationships among ideas, methods, and measures in psychological and social research. 3 units. *Costanzo*

319-320. Research Apprenticeship I. Individualized research training with a faculty mentor. 6 units. *Staff*

323, 324. Seminar in Community Psychology. An examination of the organization and functioning of community systems and an exploration of factors involved in system changes through psychologically based intervention strategies. On-line experiences with school system consultation will provide a primary basis for study. 3 units each. *Alexander or Costanzo*

331-332. Research Apprenticeship II. Individualized research training with a faculty mentor. 6 units. *Staff*

335-336. Clinical Inquiry I. Introduction to the process of the assessment of persons, including the study of personal documents, interview data, objective and projective test material, naturalistic observations, and third-party reports. Laboratory sessions involve work with normal human subjects over extended time periods. 6 units. *Alexander and staff*

337. Seminar in Sensory Discrimination. The neural bases of discrimination in vertebrates and invertebrates studied by neurophysiological, electrophysiological, and psychophysical techniques. 3 units. *R. Erickson*

343-344. Clinical Inquiry II. Intensive experience and supervision in clinical intervention processes. Student training in psychotherapy strategies and techniques and in clinical consultation skills is conducted in clinical settings. 6 units. *Staff*

348. Psychotherapy with Children and Families. Major theoretical approaches to clinical intervention with children and adolescents, either individually or in the family system context. 3 units. *Coie*

349-350. Practicum in Psychological Research. 6 units. *Staff*

351. Developmental Psychopathology. Consideration of major psychopathological disorders in childhood and adolescence, theories and research on etiology and prediction of disorder. 3 units. *Thompson and Lochman*

352. Child Assessment. Interview methods; intelligence and achievement testing; personality and developmental batteries; peer, teacher, and parental instruments; and observational techniques. 3 units. *Coie and Putallaz*

398. Graded Research. 1 to 3 units. *Staff*

399. Special Readings in Psychology. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

325. Seminar in Animal Behavior

329-330. Proseminar in Psychology

334. Seminar: Behavioral Studies of the Brain

338. Pictorial Representation and Iconic Communication

Public Policy Studies

Associate Professor Behn, *Director* (109C Old Chemistry); Professor Cook, *Associate Director* (223 Old Chemistry); Assistant Professor Luger, *Director of Graduate Studies* (223 Old Chemistry); Bonnie Bain, *Director of Internship Programs and Placement Services* (122B Old Chemistry); Professors Ascher, Barber (political science), Clotfelter, Eddy, Fleishman (School of Law), Gillis, Horowitz (School of Law), Hough (political science), Lange (School of Law), Pearsall (engineering), Price (political science), and Viscusi (Fuqua School of Business); Associate Professors Kuniholm, Lipscomb, Magat (Fuqua School of Business), McConahay, Stack, and Vaupel; Assistant Professors Entman and Shetty; Professors of the Practice Geller, Stubbing, and Yaggy; Lecturer Payne

The graduate program in public policy studies is offered through the Institute of Policy Sciences and Public Affairs. The objective of the program is to prepare students for jobs, particularly in the public sector, which require analytical skills and a practical understanding of the processes by which policy is made and implemented.

The A.M. degree requires two academic years and a summer internship. The first year is devoted to core courses in policy analysis, including sequences in quantitative methods, economics, political analysis, and ethics. The summer internship is arranged with a federal, state, or local agency. The second-year curriculum includes course work in public management and macroeconomics, a concentration in a substantive policy area, and a masters "memo" to be researched and written on a problem of current policy concern.

Students who are concurrently enrolled in a Ph.D. program or a professional degree program (M.D., J.D., M.B.A., M.H.A., etc.), or who have already obtained such a degree, can apply for an abbreviated version of the A.M. program. Such students are excused from most second-year requirements, so ordinarily the A.M. in public policy can be completed in one additional year. Students usually apply for a

joint degree program simultaneously with their applications to the graduate departments or professional schools, or during their first or second year of advanced study.

The institute does not award a Ph.D.

More information concerning the A.M. programs can be obtained by writing the Director of Graduate Studies.

For Seniors and Graduates

204S. Ethics in Political Life. C-L: Political Science 204S. 3 units. *Spragens*

215S. Public Policies to Save Lives. Economic, political, legal, and ethical issues in governmental efforts to reduce mortality through various health and safety programs and regulations. 3 units. *Vaupel*

217. Microeconomics and Public Policy Making. Consumption and production theory, welfare economics, theories of collective choice, market structures and regulation, and nonmarket decision making. 3 units. *Clotfelter*

218. Macroeconomic Policy. Survey of macroeconomic theory and analysis of policies designed to reduce unemployment, stimulate economic growth, and stabilize prices. Conventional monetary and fiscal instruments, employment policies, and new policies designed to combat inflation. C-L: Economics 218. 3 units. *Luger*

219. The Politics of the Policy Process. The formulation of public policies, substantive policies in a variety of contexts from local government to international affairs; the role of legislatures, interest groups, chief executives, and the bureaucracy in defining alternatives and in shaping policy from agenda formulation to implementation. (Not open to students who have taken Public Policy Studies 114.) C-L: Political Science 248. 3 units. *Staff*

221. Analytical Methods I: Decision Analysis for Public Policy Makers. Methods for structuring decision dilemmas and decomposing complex problems, assessing the probabilities of uncertain consequences of alternative decisions, appraising the decision maker's preferences for these consequences and for re-examining the decision. (Not open to students who have taken Public Policy Studies 55.) 3 units. *Behn or Lipscomb*

222. Analytical Methods II: Data Analysis for Public Policy Makers. Sampling theory, Bayesian statistics, and regression analysis. Examples from problems in health care, transportation, crime, urban affairs, and politics. (Not open to students who have taken Public Policy Studies 112.) 3 units. *McConahay*

223. Ethics and Policy Making. Normative concepts in politics, liberty, justice, the public interest: historical and philosophical roots, relationship to one another and to American political tradition, and implications for domestic policy problems. C-L: Political Science 245. 3 units. *Price*

231. Analytical Methods III: Quantitative Policy Evaluation. Problems in quantifying policy target variables such as unemployment, crime, and poverty. Experimental and nonexperimental methods for evaluating the effect of public programs, including topics in experimental design, regression analysis, and simulation. Prerequisite: Public Policy Studies 222 or equivalent. 3 units. *McConahay*

232. Analytical Methods IV: Topics in Economic Policy. Cost benefit analysis of public programs. Public utility regulation, pollution regulation, hospital rate setting, regulation of product safety. Quantitative methods and microeconomic theory for analysis of both normative and positive aspects of economic policy. Prerequisites: Public Policy Studies 110 or 217 or Economics 149 and familiarity with regression analysis or concurrent enrollment in Public Policy Studies 231. C-L: Economics 232. 3 units. *Gillis*

236S, 237S. Public Management I and II: Managing Public Agencies. 236S: operations management, information and performance, personnel management, public sector marketing. 237S: organizational strategy, organizational structure and design, leadership and motivation, labor negotiations. Prerequisite for 237S: Public Policy Studies 236S. 3 units each. *Behn and Yaggy*

238S. Public Budgeting and Financial Management. Fund accounting for government; techniques of financial analysis, including break-even analysis, cost accounting, cash-flow analysis, and capital budgeting; and governmental budgeting, including the budgetary process and reforms, and the budget crunch in the public sector. 3 units. *Behn or Stubbing*

240S. Analyzing the News. Research seminar on political messages and effects of media. Methods and findings of content analysis, survey research, critical theory, semiology; research project integrating these approaches. C-L: Political Science 208S. 3 units. *Entman*

241. Reporting the American People. Critical analysis of the sources of information the media rely upon in reporting opinion and policy preferences: opinion polls, bellwethers, informed elites. Includes the design and execution of a public opinion poll on a topic of local or national interest. 3 units. *McConahay*

242S. Comparative Law and Policy: Ethnic Group Relations. Various approaches to the reduction of conflict in deeply divided societies, primarily in Asia and Africa, with secondary attention to Western countries. The nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. C-L: Political Science 242S and Law 572. 3 units. *Horowitz*

250. Public Policy and the Arts. Democratic and aesthetic values in respect to past and present patterns of public support for the arts; for example, subsidies, tax policy, censorship, and the effect of public choices on standards of quality. 3 units. *Payne*

254. Transportation Planning and Policy Analysis. C-L: Civil and Environmental Engineering 216. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. 3 units. *Pas*

257. United States Policy in the Middle East. From World War II to the present with a focus on current policy options. 3 units. *Kuniholm*

264S. Research Seminar: Topics in Public Policy I. Selected topics. 3 units. *Staff*

267S. Policy Making in International Organizations. Emphasis on international financial institutions such as the World Bank and the International Monetary Fund. C-L: Political Science 267S. 3 units. *Ascher*

268. Federal Tax Policy. Structure, incidence, and economic effects of major federal taxes. Special attention to problems of inflation, income definition, distortions, savings, and investment. C-L: Economics 268 and Law 518. 3 units. *Clotfelter or Schmalbeck*

270S. Humanistic Perspectives on Public Policy. Modes of inquiry into aspects of social life important to policy makers but beyond the normal reach of social science. Reading from James Agee, Robert Coles, Eudora Welty, James Baldwin, George Eliot, and others. Prerequisite: consent of instructor. 3 units. *Payne and Coles*

272. Resource Economics and Policy. C-L: Forestry and Environmental Studies 270. 4 units. *Hyde*

278. Human Service Bureaucracies. Schools, prisons, courts, welfare agencies: decision making, implementation, the impact of work practices on clients. The future of street-level bureaucracy. 3 units. *Stack*

283S. Congressional Policy Making. C-L: Political Science 283S. 3 units. *Price*

284S. Public Policy Process in Developing Countries. Policy-making patterns in less developed countries; examples from Latin America, Africa, and Asia. C-L: Political Science 284S. 3 units. *Ascher*

286S. Economic Policy Making in Developing Countries. Fiscal, monetary, and exchange rate policies in less developed countries; issues in public policy toward natural resources and state-owned enterprises. Prerequisites: Public Policy Studies 110 or Economics 149, or consent of instructor. C-L: Economics 286S. 3 units. *Gillis*

290. Glasgow Seminar in Public Policy. The large theoretical problems of public policy (e.g., justice, equality, liberty); the making and implementation of policy in specific areas (e.g., economic, urban, social); comparative analysis of Europe's communist countries and how their political systems differ from those of the United States and Britain. Prerequisites: Public Policy Studies 55, 110, 112, 114, 116, and permission of the Director of Undergraduate Studies (who may waive requirements in exceptional circumstances). Taught in Scotland. 3 units. *Staff*

For Graduates

303. Public Policy Workshop I. Introduction to policy analysis and advising. Emphasis on written and oral communication skills, the substance of public policies, and the role of policy analysts. Open to Public Policy Studies A.M. students only. 3 units. *Behn or Luger*

304.01. Public Policy Workshop II. The role and influence of policy analysis. The examination of specific public policy cases and recommendations for action. Emphasis on written and oral communications skills. 3 units. *Behn*

305.01. Public Policy Workshop III. Emphasis on individual or group projects. Preparation for Masters Memo. Open to Public Policy Studies A.M. students only. 3 units. *Yaggy*

387. Research Tutorial in Public Policy. 3 units. *Staff*

388. Research Tutorial in Public Policy. 3 units. *Staff*

399. Special Readings in Public Policy Studies. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

256. The Economics of Health Care

Religion

Associate Professor Bland, *Chairman* (117B Gray); Professor E. Meyers, *Director of Graduate Studies* (209A Divinity School); Professors Beach, Bradley, Campbell, Clark, Hauerwas, Herzog, Kort, Lacy, Langford, Lawrence, Lincoln, Long, Murphy, Osborn, Poteat, D. M. Smith, H. Smith, Steinmetz, Via, Wainwright, Wintermute, and Young; Associate Professors Bailey, Corless, Gregg, C. Meyers, Partin, and Peters; Assistant Professor Robinson; Adjunct Professor Sasson; Professor Emeritus Henry

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of seven fields: (1) Old Testament and Semitic studies, (2) New Testament and Christian origins, (3) history of Christianity, (4) Christian theology and ethics, (5) history of Judaism, (6) history of religions, and (7) religion

and culture. They will be expected to take courses which will contribute to an adequate understanding of their chosen fields of specialization and will be required to take two written preliminary examinations within their field of concentration.

In addition to course work in their major field, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies and will be required to take one written preliminary examination in a single cognate area within the department. A minor requirement may be fulfilled by work in a cognate department, such as classical studies, history, philosophy, political science, or sociology, and will constitute the outside minor and material for a fourth written preliminary examination. There is, in addition, an oral examination conducted by the student's committee immediately subsequent to the written examinations.

The program of doctoral studies presumes a foundation in the academic study of religion. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only upon the satisfactory completion of the A.M. degree with the department.

The graduate program also offers an A.M. degree that is not linked to a specific Ph.D. field. Such study is intended to encourage individuals to pursue a variety of interests irrespective of whether they desire further graduate study. An A.M. concentration may be in any of the seven Ph.D. fields or in an individually designed program of study (such as Islamic studies or religion and the social sciences).

For Seniors and Graduates

204. Origen. The systematic and apologetic writings of an important Alexandrian thinker and exegete of the third century. 3 units. *Gregg*

207, 208. Intermediate Biblical Hebrew. Grammar with reading and exegesis of Old Testament prose and poetry. Prerequisite: at least one year of Hebrew or consent of instructor. C-L: Old Testament 207, 208 in the Divinity School. 6 units. *Staff*

209. Old Testament Theology. Studies of the Old Testament in regard to theological themes and content. 3 units. *Murphy*

210. Contemporary British Theology. Selected problems in representative British theological writings after 1900. 3 units. *Langford*

213. Christian Ethics in America. Ethical thought in America since Rauschenbush. 3 units. *Hauerwas*

215S. Theological Ethics. Philosophical paradigms and the nature of the Christian life. 3 units. *Hauerwas*

217. Islam in India. History and thought of major Indian Muslims from Biruni to Wali-Ullah, with special attention to the role of Sufism. An introduction to selected Muslim scholars and saints who contributed to the interaction between Islam and Hinduism in northern India during the second millennium A.D. 3 units. *Lawrence*

218. Religion in Japan. A survey of religion in Japan, with special emphasis on indigenization and attempts at synthesis. An approach to the meaning of the words *religious* and *secular* in the Japanese situation. 3 units. *Corless*

219. Augustine. The religion of the Bishop of Hippo in late antiquity. C-L: Medieval and Renaissance Studies. 3 units. *Gregg*

220. Rabbinic Hebrew. Interpretive study of late Hebrew, with readings from the Mishnah and Jewish liturgy. 3 units. *E. Meyers or staff*

221. Readings in Hebrew Biblical Commentaries. Selected Hebrew texts in Midrash Aggadah and other Hebrew commentaries reflecting major trends of classical Jewish exegesis. 3 units. *Bland or staff*

223A-G. Exegesis of the Hebrew Old Testament. Interpretation based upon Hebrew exegesis, stress upon hermeneutic methods. 3 units each.

A. Amos and Hosea. *Bailey*

B. Job. *Murphy*

C. I Samuel. *Bailey*

D. Song of Songs. *Murphy*

E. Ecclesiastes. *Murphy*

F. Haggai, Zechariah, and Malachi. *E. Meyers*

G. Proverbs. *Murphy*

225. Living Issues in New Testament Theology. Critical examination of major problems and issues in New Testament interpretation and theology. 3 units. *D. M. Smith*

226A-F. Exegesis of the Greek New Testament I. 3 units each.

A. Matthew. 3 units. *Via*

B. Romans. *Staff*

C. Mark. 3 units. *Via*

E. The Gospel and Epistles of John. *D. M. Smith*

F. I and II Corinthians. *D. M. Smith*

227A-D. Exegesis of the Greek New Testament II. 3 units each.

A. Luke-Acts. *Young*

B. Galatians. *D. M. Smith*

C. The Pastoral Epistles. *Young*

D. Epistles of Peter and James. *Young*

228. Twentieth-Century Continental Theology. An investigation of leading theologians and theological trends. 3 units. *Osborn*

230S. The Meaning of Religious Language. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. C-L: Philosophy 230S. 3 units. *Poteat*

231S. Seminar in Religion and Contemporary Thought. Analytical reading and discussion of such critical cultural analysis as is found in the works of Polanyi, Arendt, Trilling, and others, with appraisal of the relevance of theological inquiry. 3 units. *Poteat*

232S. Religion and Literature. Theories concerning the relation of religion to literary forms, particularly narrative. 3 units. *Kort*

233. Modern Narratives and Religious Meanings. A study of kinds of religious meaning or significance in representative American, British, and Continental fiction of the first half of the twentieth century. 3 units. *Kort*

234. Early Christian Asceticism. The development of asceticism and monasticism in the first six centuries of Christianity. 3 units. *Clark*

235. Heresy: Theological and Social Dimensions of Early Christian Dissent. 3 units. *Clark*

236. Luther and the Reformation in Germany. The theology of Martin Luther in the context of competing visions of reform. C-L: Medieval and Renaissance Studies. 3 units. *Steinmetz*

237. History of the Ancient Near East. Emphasis upon the religions, literature, and art of Mesopotamia. 3 units. *Bailey*

238. Jewish Responses to Christianity. Apologetic and polemical themes in rabbinic, medieval, and contemporary writings. 3 units. *Bland*

239. Introduction to Middle Egyptian I. Grammar and readings in hieroglyphic texts relating to the Old Testament. 3 units. *Wintermute*

240. Introduction to Middle Egyptian II. Readings in Middle Egyptian and introduction to New Egyptian Grammar. Prerequisite: Religion 239. 3 units. *Wintermute*

241. Problems in Reformation Theology. C-L: Medieval and Renaissance Studies. 3 units. *Steinmetz*

243. Archaeology of Palestine in Biblical Times. Investigation of selected material remains from the Bronze Age to the Persian period. Trends in biblical studies, with particular attention to methodological considerations and current developments. 3 units. *C. Meyers*

244. The Archaeology of Palestine in Hellenistic-Roman Times. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish art. 3 units. *C. Meyers or E. Meyers*

245. Ethics in World Religions. Moral foundations, assumptions, and applications in such major faiths as Hinduism, Buddhism, Confucianism, and Islam, in the light of Christian ethical perspectives. 3 units. *Lacy*

246. Problems in Historical Theology. Prerequisite: consent of instructor. 3 units. *Staff*

248. The Theology of Karl Barth. A historical and critical study of the theology of Karl Barth. Prerequisite: consent of instructor. 3 units. *Osborn*

249. The Lord's Prayer. Introduction to God, man, prayer, and kingdom through historical and contemporary expositions of the Lord's Prayer. 3 units. *Wainwright*

256. John Wesley in Controversial and Ecumenical Theology. A study of John Wesley and his theology: his engagements with other confessional traditions, and his views on such matters as church, ministry, sacraments, and authority. Relation to contemporary theology, especially "Faith and Order." 3 units. *Wainwright*

257. New Testament Ethics. Scope and basic problems of New Testament ethics; consideration of two important New Testament books. Problems and issues such as the role of the law, symbolic language in ethical discourse, conscience, homosexuality, the state, and self deception. 3 units. *Via*

258. Coptic. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 units. *Wintermute*

262. Marxist Ideology and Christian Faith. Comparative examination of Communist and Christian doctrines concerning humans, society, sin, history, and eschatology, together with an introduction to the contemporary dialogue. 3 units. *Lacy*

264. The Sociology of the Black Church. An effort to identify, define, describe, and interpret the black church. 3 units. *Lincoln*

265. The Religions of the West Africa Diaspora. Religious development of Africans displaced to the Western Hemisphere by slavery. 3 units. *Lincoln*

279. Understandings of the Resurrection in Contemporary Thought. Recent literature on the resurrection of Jesus Christ from the perspectives of exegesis, historical criticism, hermeneutics, and systematic significance. 3 units. *Wainwright*

280. The History of Religions. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. 3 units. *Partin*

281. Phenomenology and Religion. The writing of Scheler, E. Strauss, Merleau-Ponty, Ricoeur, Binswanger, or others; their bearing upon religious knowledge and practice. Prerequisite: consent of instructor. 3 units. *Poteat*

282. Myth and Ritual. Myths, rites, and symbols as modes of religious expression. Interpretation of symbolic configurations of kingship, initiation, sacrifice, and pilgrimage in diverse cultural contexts. 3 units. *Robinson and staff*

283. Islam and Modernism. Cultural, religious, and ideological forces which shape Muslim responses to modernism. 3 units. *Lawrence*

284. The Religion and History of Islam. Origins and development of the Islamic community and tradition, with particular attention to the religious element. 3 units. *Partin*

285. Introduction to the History of Religions. The history, symbols, rites, and structures of the manifestations of the sacred in the major religious traditions of the world. 3 units. *Staff*

287. The Scriptures of Asia. Translations of basic texts from the religious traditions of India, China, and Japan. 3 units. *Bradley*

288. Buddhist Thought and Practice. A historical introduction to Buddhist thought and practice, with special attention to their interrelationship in the living religion. 3 units. *Corless*

289. Theology and Contemporary Secular Understanding of Human Nature. Critical theological examination of selected current interpretations of human nature and the human situation. 3 units. *Langford*

290. Current Problems in Christian Social Ethics. A critical study of secularization, the technological revolution, and the ecological crisis. 3 units. *Beach*

291. Historical Forms of Protestant Ethics. A survey of major types of Protestant ethical theory from Luther through contemporary figures. 3 units. *Beach*

292. Happiness, Virtue, and Friendship. Issues of their relationship in moral philosophy. 3 units. *Hauerwas*

294. Christianity and the State. The relation of the Christian theory of the state to political problems, with special consideration of the religious assumptions underlying democratic theory and practice and of the relationship of church to state. 3 units. *Beach*

296. Religion on the American Frontier. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. 3 units. *Henry*

For Graduates

300. Systematic Theology: The Doctrine of the Trinity. Biblical bases, patristic developments, contemporary statements and connections. 3 units. *Wainwright*

302. Studies in the Intertestamental Literature. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to postexilic Judaism. Prerequisite: consent of instructor. 3 units. *Staff*

304. Aramaic. A study of the Aramaic portions of the Old Testament and selected passages from the Elephantine and Qumran texts. 3 units. *E. Meyers or Wintermute*

305. The Septuagint. A study of the modern critical use of the Greek Old Testament. Prerequisite: knowledge of Greek and Hebrew. 3 units. *Peters*

306. Language and Literature of the Dead Sea Scrolls. A study in interpretation. Prerequisite: a knowledge of Hebrew. 3 units. *Staff*

307. Syriac. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Prerequisite: some knowledge of Hebrew and Aramaic. 3 units. *Staff*

308. Greek Patristic Texts. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. 3 units. *Young*

309. Hermeneutics. Consideration of the nature of understanding and of several interpretive methods--such as phenomenological, existential, historical, literary, structural--along with their application to NT texts, primarily the parables of Jesus. 3 units. *Via*

310. Readings in Judaica. Selected studies in Jewish material culture and problems in Jewish religious and intellectual history. 3 units. *Bland, E. Meyers, and staff*

318. Seminar in the Greek Fathers. A study of selected topics from the Greek Fathers. 3 units. *Young or Gregg*

320. Theology, Power, and Justice. Critical examination of a major theme of modern Protestant thought in Hegel, Marx, Schleiermacher, and Tillich. 3 units. *Herzog*

322. Nineteenth-Century European Theology. Protestant theology from Kant to Herrmann. 3 units. *Herzog*

323A. Comparative Semitic I. An introduction to the morphology and syntax of classical Ethiopic and the Semitic languages of Mesopotamia, together with a consideration of their relationship to Hebrew. 3 units. *Wintermute*

323B. Comparative Semitic II. An introduction to the morphology and syntax of classical Arabic and the Semitic languages of Palestine-Syria, together with a consideration of their relationship to Hebrew. 3 units. *Wintermute*

324. Readings in the History of Religion. An examination of the theories, methods, and purposes of the study of non-Western religions within the Western tradition. 3 units. *Long*

325. Philosophical Theology I. Theology, as the knowledge of God, considered in dialogue with selected pagan and Christian philosophers from Plato to Kant. 3 units. *Staff*

326. Philosophical Theology II. 3 units. *Staff*

329. Readings in Theology and Language. Sample treatments of religious language in linguistic analysis, hermeneutical theory, literary criticism, liturgical practice, and fundamental theology. 3 units. *Wainwright*

330. Contemporary Christologies. A seminar dealing with contemporary Roman Catholic and Protestant Christology. Readings and discussion will focus on theological proposals from major contemporary figures. 3 units. *Wainwright*

331. Eschatology. A study of issues in individual, communal, and universal eschatology against the background of twentieth-century scholarly work on the kingdom of God. 3 units. *Wainwright*

334. Theology and Reform in the Later Middle Ages. The life and thought of the medieval church from the twelfth century through the fifteenth. Popular and academic theologians from Pierre Abelard to Gabriel Biel. 3 units. *Steinmetz*

337. Theology of St. Thomas Aquinas. Intensive reading of the *Summa Theologica* and biblical commentaries. 3 units. *Staff*

338. Calvin and the Reformed Tradition. The theological development of John Calvin. A comprehensive examination of his mature position with constant reference to the theology of other reformers. C-L: Medieval and Renaissance Studies. 3 units. *Steinmetz*

340, 341. Seminar in the New Testament. Research and discussion on a selected problem in the biblical field. Spring only. 3 units each. *Staff*

343. Readings in Ancient Near Eastern Wisdom Literature. A survey of the principal Egyptian and Mesopotamian works that relate to Biblical wisdom. 3 units. *Murphy*

350, 351. Old Testament Seminar. Research and discussion on selected problems in the Old Testament and related fields. Fall only. 3 units each. *Staff*

352. Seminar in Christian Theology. Research and discussion of a selected problem in the systematic field. 3 units. *Staff*

353. Seminar on Text Criticism. Emphasis upon transmission, versions, apparatus, and method. Prerequisite: reading knowledge of Hebrew and Greek. 3 units. *Bailey*

360. Special Problems in Religion and Culture. Intensive investigation of the relations of religion and modernity, using seminal contemporary texts. Topics announced each semester. Prerequisite: consent of instructor. 3 units. *Poteat*

373-374. Elementary Akkadian. Study of the elements of Akkadian grammar. Reading of neo-Assyrian texts shedding light on the Old Testament. Prerequisite: biblical Hebrew. 6 units. *Bailey*

377. Contemporary American Dramatic Arts and Evolving Theological Forms. An examination of creed and ritual implicit and explicit in contemporary American theater, film, and television. 3 units. *Henry*

380. Existentialist Thought. An exploration of the interests and motifs of existentialism in relation to modern philosophy and theology through an analysis of representative writings of Kierkegaard, Heidegger, Berdyaev, Marcel, and Sartre. 3 units. *Poteat*

383. Moral Theology in the Twentieth Century. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. 3 units. *H. Smith*

384. Religious Dissent in American Culture. History and significance of dissent in the theology and culture of America. 3 units. *Henry*

385. Religion in American Literature. A critical study of the meaning and value of religious motifs reflected in American literature. 3 units. *Henry*

386. Christianity in Dialogue with Other Faiths. Contemporary currents of Christian thought as they affect resurgent non-Christian faiths, new formulations of a theology of mission, and ecumenical conversations. 3 units. *Lacy*

387. Ethical Method. Selected methodological issues in contemporary theological ethics. 3 units. *H. Smith*

389. Christian Ethics and Contemporary Culture. A study of the interaction between Christian thought and current social theory. 3 units. *Beach*

395. Christian Thought in Colonial America. Exposition of the main currents in Protestant theology. 3 units. *Henry*

396. Liberal Traditions in American Theology. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. 3 units.
Henry

COURSES CURRENTLY UNSCHEDULED

- 206. Christian Mysticism in the Middle Ages**
- 242. Life after Death in Semitic Thought**
- 247. Readings in Latin Theological Literature**
- 251. Counter-Reformation and Development of Catholic Dogma**
- 252. Nineteenth- and Twentieth-Century Roman Catholic Theology**
- 301. Seminar in Contemporary Christian Ethics**
- 304A. Targumic Aramaic**
- 311. Pharisaic Judaism in the First Century**
- 312. Pauline Theology**
- 313. The Apostolic Fathers**
- 314. Judaism and Christianity in the New Testament**
- 315-316. Seminar: History of Religions**
- 317. Seminar in the Greek Apologists**
- 319. The Gospel According to Saint Matthew in Recent Research**
- 327. Philosophical Method in Religious Studies**
- 328. Twentieth-Century European Theology**
- 335. The English Church in the Eighteenth Century**
- 339. The Radical Reformation**
- 344. Zwingli and the Origins of Reformed Theology**
- 388. Ethics and Medicine**
- 397. Contemporary American Theology**
- 398. Colloquium on the Teaching of Religion**
- 401. Colloquium on Biblical Studies**

Romance Languages

Professor Stewart, *Chairman* (205 Languages); Associate Professor Pérez, *Director of Graduate Studies* (02 Languages); Professors Cordle, Fein, Osuna, Tetel, and Wardrop-per; Associate Professors Caserta, Garci-Gómez, Hull, Orr, and Thomas; Assistant Professor Bell

The Department of Romance Languages offers graduate work leading to the A.M. and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. Related work for the A.M. and Ph.D. degrees is required in a second Romance language or in any one or two of a number of other subject areas.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

FRENCH

For Seniors and Graduates

210. The Structure of French. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. 3 units. *Hull*

211. History of the French Language. The evolution of French from Latin to its present form; internal developments and external influences. C-L: Medieval and Renaissance Studies. 3 units. *Hull*

223. Semiotics for Literature. A study of theoretical writings in general semiotics by Frege, Peirce, Saussure, Mukarovsky, Morris, and their applications for textual analysis of French literary works by representative contemporary critics such as Eco, Riffaterre, Corti, and Greimas. In English. 3 units. *Thomas*

248. French Literature of the Seventeenth Century. The baroque and the classical: form and meaning in the plays of Corneille, Racine, and Moliere. Readings in baroque and précieux poetry. C-L: Medieval and Renaissance Studies. 3 units. *Staff*

251, 252. Literature of the Eighteenth Century. Problems of literary history, critical reading, and interpretation, focused on varying topics. 6 units. *Stewart*

256. Modern Literature and History. The problems of history, society, and politics in literature, through the writings of Rousseau, Tocqueville, Michelet, Flaubert, Hugo, Merleau-Ponty, Foucault, and others. 3 units. *Orr*

257, 258. The Nineteenth-Century French Novel. 257: romanticism and romantic realism, studies especially in the works of Chateaubriand, Stendhal, and Balzac. 258: realism and naturalism, with special emphasis on Flaubert and Zola. 6 units. *Staff*

261. French Symbolism. Poetry and theories of Baudelaire, Mallarmé, and Rimbaud. Decandence: Lautréamont and Laforgue. 3 units. *Thomas and staff*

263. Contemporary French Theater. Dramatic theory; the art of the leading directors; and the major texts of Claudel, Giraudoux, Anouilh, Sartre, Beckett, Ionesco, and Genet. 3 units. *Cordle*

265, 266. French Literature of the Twentieth Century. 265: to 1935, emphasis on Gide, Mauriac, and Malraux. 266: after 1935, emphasis on Sartre, Camus, and the *nouveau roman*. 6 units. *Cordle*

290S. Studies in a Contemporary Figure. A writer, philosopher, critic, or artist. 3 units. *Staff*

For Graduates

325. French Prose of the Sixteenth Century. Rabelais, Marguerite de Navarre, Montaigne, and others. C-L: Medieval and Renaissance Studies. 3 units. *Tetel*

326. Topics in Renaissance Poetry. C-L: Medieval and Renaissance Studies. 3 units. *Tetel*

391, 392. French Seminar. 3 units. *Bell, Cordle, Orr, Stewart, Tetel, and Thomas*

Graduate Reading Course. An intensive course in French to develop rapidly the ability to read French in several fields. Graduate students only. No credit.

Courses Currently Unscheduled

255. French Preromantic and Romantic Poetry

ITALIAN

For Seniors and Graduates

283. Italian Novel of the Novecento. Representative novelists from Svevo to the most recent writers. 3 units. *Caserta*

284. Dante. *La Vita Nuova* and a close reading of the *Inferno*. Conducted in English. C-L: Medieval and Renaissance Studies. 3 units. *Caserta*

285. Dante. The *Purgatorio* and the *Paradiso* in the light of Dante's cultural world. Special attention will be given to the poetic significance of the *Commedia*. Prerequisite: Italian 284 or equivalent. C-L: Medieval and Renaissance Studies. 3 units. *Caserta*

SPANISH

For Seniors and Graduates

210. History of the Spanish Language. Formation and development of Spanish: internal forces and external contributions. C-L: Medieval and Renaissance Studies. 3 units. *Garci-Gómez*

241. Colonial Prose of Spanish America. Narrative forms written in Spanish America during the sixteenth, seventeenth, and eighteenth centuries. 3 units. *Ross*

245. Modern Spanish-American Poetry. From *modernismo* to the present. 3 units. *Fein*

246. Modern Spanish-American Fiction. Twentieth-Century novels and short stories by Borges, Carpentier, Cortázar, Gallegos, García Márquez, Quiroga, and others. 3 units. *Pérez*

251. The Origins of Spanish Prose Fiction. Selected examples of the romance and the novel: *Amadís de Gaula*, Diego de San Pedro's *La Cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemajor's *Diana*. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

253. Cervantes. The life and works of Cervantes, with special emphasis on his *Quijote*. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

254. Drama of the Golden Age. Study of the chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

258S. Spanish Lyric Poetry before 1700. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and baroque. Special emphasis on the *Razón de amor*, the *Poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

262. The Romantic Movement. Principal manifestations of romanticism in Hispanic literature; poetry (Bécquer, Espronceda, Rosalía de Castro), drama (Rivas, Zorrilla), and the novel (Issacs, Mármol). 3 units. *Pérez*

275. Modern Spanish Poetry. Juan Ramón Jiménez, Unamuno, Antonio Machado, the Generation of 1927, and the contemporary poets. 3 units. *Osuna*

276. Modern Spanish Drama. The theater of Benavente, Valle-Inclán, Lorca, Casona, Buero Vallejo, Sastre, and Arrabal. 3 units. *Osuna*

277. Modern Spanish Novel. From the Generation of 1898 to the present. 3 units. *Osuna*

For Graduates

391, 392. Hispanic Seminar. Each semester one of the following topics will be selected for intensive treatment: the Spanish language in America, studies in medieval literature, studies in the literature of the Golden Age, studies in Latin American literature, studies in the Spanish Renaissance and baroque, studies in Spanish poetry, studies in nineteenth-century Spanish literature, and studies in twentieth-century literature. C-L: Medieval and Renaissance Studies. 6 units. *Fein, Garci-Gómez, Osuna, Pérez, Wardropper*

ROMANCE LANGUAGES

218. The Teaching of Romance Languages. Evaluation of objectives and methods; practical problems of language teaching at the elementary, secondary, and college levels; analysis of textbooks, texts, and audiovisual aids; applied linguistics. 3 units. *Hull*

310. Computers for the Humanities. Applications of computers in three major humanistic areas: (a) textual research—concordances, stylistic analysis, critical editing; (b) text processing; and (c) computer-assisted or computer-managed instruction in the humanistic disciplines. No prior training in computing is required. Theoretical lectures and programming practicum. 3 units. *Thomas*

Slavic Languages and Literatures

Professor Krynski, *Chairman* (314 Languages); Associate Professor Emeritus Jezierski

The Department of Slavic Languages and Literatures offers graduate courses in Russian language and literature and limited training in the language and literature of Poland.

Students should have sufficient preparation in the Russian language to enable them to read Russian classical literature in the original. Any presently unscheduled course will be taught in any semester upon request.

For Seniors and Graduates

201, 202. Russian Novel of the Nineteenth Century. 201: 1830 to 1870. 202: 1870 to 1900. Prerequisites: Russian 161 and 162 or equivalents. 6 units. *Krynski*

225. Tolstoy. *War and Peace* and other works. Prerequisite: Russian 175S or equivalent. 3 units. *Jezierski*

232. Dostoevsky. Emphasis on *Brothers Karamazov* and the theory of the novel. Prerequisite: Russian 176 or equivalent. 3 units. *Jezierski*

COURSES CURRENTLY UNSCHEDULED

230. Chekhov

Sociology

Professor Kerckhoff, *Chairman* (268 Sociology-Psychology); Professor Smith, *Director of Graduate Studies* (332 Sociology-Psychology); Professors Back, McKinney, Maddox, Myers, Palmore, Preiss, Simpson, and Tiryakian; Associate Professors Campbell, George, and Wilson; Assistant Professors Gereffi, O'Rand, Spenner, and Stark; Research Associate Professor Manton

The department offers graduate work leading to the A.M. and Ph.D. degrees in sociology. Students beginning work toward an advanced degree should have com-

pleted a minimum of 12 semester hours of acceptable courses in sociology and an additional 12 semester hours in related work (e.g., other social sciences, statistics, computer science, philosophy, mathematics). Accepted applicants who have not had such preparation may be required to take work beyond the usual requirements. Applicants for admission are required to take the verbal and quantitative aptitude tests of the Graduate Record Examination.

The department concentrates its Ph.D. training in two programs: life course analysis, and changing world societies. Each program has its own two-core-course requirement, as well as a common six-course requirement covering theory (280, 281), methodology and research methods (296, 297), and statistics (293, 294). In addition, each program has an informal seminar series and expects student involvement in related research activities. In order to assure some breadth of training, all students also are required to take one of the core courses of the program in which they are not concentrating and at least four other departmental courses beyond those listed above. Two additional courses outside the department in related work are also required, for a total of fifteen courses beyond the bachelor's degree.

There is a qualifying procedure after three semesters, or equivalent, to determine whether the student can proceed to the preliminary examination which consists of two four-hour written examinations and a two-hour oral examination covering the core curriculum and the program area chosen by the student. Further details concerning the general departmental program, the specialized programs, departmental facilities, the staff, ongoing research, and various stipends available may be obtained from the Director of Graduate Studies.

For Seniors and Graduates

201S. Social Change. Comparisons of alternative theoretical schools of social change and societal transformations: functional, evolutionary, conflict, Marxist, dependency, and world systems perspectives. 3 units. *Gereffi or Tiryakian*

203. Comparative Aspects of Societal Transformation. Comparative perspectives on the major axes of social differentiation within societies (age, sex, class, religion) and their related forms of social organization (kinship networks, labor markets, professions, social movements). Ecological, demographic, and ideological factors in societal transformation. 3 units. *Simpson or Smith*

204. The Dynamics of Global Interdependence. Emergence and structure of interdependence. Stability and change. Societal interdependence at the social, cultural, political, and economic levels. 3 units. *Gereffi or Tiryakian*

234S. Political Economy of Development: Theories of Change in the Third World. C-L: Anthropology 234S, History 234S, and Political Science 234S. 3 units. *Berquist, Fox, Gereffi, Smith, and Valenzuela*

241. Social Stratification. The nature of hierarchical and vertical differentiation for the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. The transmission of inequality from one generation to the next. 3 units. *Campbell, O'Rand, or Stark*

243. Population Dynamics and Social Change. Social scientific aspects of the determinants and consequences of population trends. 3 units. *Myers*

244. Human Ecology and Urban Systems. Origins and development of human ecology theory, growth of cities and urban systems, residential segregation of social classes and racial and ethnic groups. 3 units. *Myers or Smith*

255. Political Sociology. Pluralist, elite, and class theories of the relationship between state and society. Topics include: recent debates on the welfare state, social

control, political participation and state-society relations in socialist economies. C-L: Political Science 255. 3 units. *Smith, Stark, or Tiryakian*

276S. Social Structure and the Life Course. The organization of education, career sequences, cohort patterns, and role definitions, adolescence, old age, and retirement; variations by race and sex. 3 units. *Campbell, Maddox, or O'Rand*

277S. Social Patterns of Personal Development. The effects of the family, school, work, and other institutional settings on the individual. 3 units. *Kerckhoff, O'Rand, or Preiss*

279S. Social Psychology. Study of group structure and processes. Dynamic relations within and between groups and the links between groups and societies. 3 units. *Back or Preiss*

280S. Contemporary Sociological Theory. An analysis of the structure and foundations of recent formulations of such theoretical approaches as phenomenological sociology, exchange theory, critical theory, structuralism, neo-Marxist sociology, sociobiology, and action theory. 3 units. *Tiryakian or Wilson*

281S. Development of Sociological Theory. Sociological thought from Comte to contemporary theorists, with particular focus on Parsons and the Parsonian School. The societal and institutional context of the development of sociological theory and paradigms. 3 units. *Tiryakian or Wilson*

282S. Canada. C-L: Anthropology 282S, History 282S, and Political Science 282S. 3 units. *Staff and visitors*

293. Introductory Statistical Analysis. Basic descriptive statistics, regression and correlation, *t*-tests and the analysis of variance, chi square techniques, and other topics. Stress on practical applications. Statistical computing using SPSS and other programs. 3 units. *Campbell*

294. Intermediate Statistical Analysis. The general linear model and its application in methods of multivariate statistical analysis: analysis of variance and covariance, multiple regression and path analysis, and log-linear models for categorical data. Statistical computing using SPSS and other programs. Prerequisite: Sociology 293 or equivalent. 3 units. *Campbell*

296S. Research Methods and Methodology. Presuppositions and basic questions in the methodology of social scientific research. Alternative research designs and the assumptions and methods of analysis. 3 units. *Back, Campbell, or Smith*

297S. Data Collection and Analysis. Survey of methods of sociological data collection: observation, experiments, surveys, and historical studies. Issues in the analysis of data: organizing data, coding, indexes, descriptive and analytic measures. Problems of interpretation, verification, and dissemination of research results. 3 units. *Back, Campbell, Kerckhoff, or Smith*

298S, 299S. Seminar in Selected Topics. Substantive, theoretical, or methodological topics. 3 units each. *Staff*

COURSES CURRENTLY UNSCHEDULED

233S. Culture, Religion, and Modernity

301. Seminar in Human Fertility

302. Seminar in Migration

325. Social Aspects of Mental Illness and Treatment

345, 346. Demographic Techniques I and II

349, 350. Seminar in Selected Topics of Demography and Ecology

373, 374. Social Psychological Issues in Sociology

385. Seminar in Sociological Theory

386. Seminar in Sociological Theory

390. Seminar in Field Methods of Sociological Research

392. Individual Research in Sociology

397, 398. Seminar in Special Research

The University Program in Toxicology

Professor of Medicine Lynn, *Director* (242 N. Duke Building); Associate Professor Abou-Donia, *Deputy Director* (020 Research Park IV); Associate Professor Graham, *Deputy Director* (M207 Davison Building); Associate Professor Richardson, *Deputy Director* (004A Biological Sciences Building)

The University Program in Toxicology seeks to produce individuals with sound training in the scientific basis for research in toxicology who will advance the science of this discipline. After broad general courses in epidemiology and statistics, pathology, and mammalian toxicology, students will be trained in one of three tracks: (1) as generalist toxicologists, with broad training in the principles and concepts of toxicology and the design of protocols for toxicological assessments; (2) as specialist toxicologists in those areas of toxicology research in which faculty members are currently productive in pulmonary toxicology, neurotoxicology, immunotoxicology, genetic toxicology (carcinogenesis), and biochemical toxicology; or (3) as ecotoxicologists with broad training in principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and the effects of toxics in the ecosystems.

The toxicology program faculty is comprised of members from the Departments of Anatomy, Biochemistry, Chemistry, Forestry and Environmental Studies, Microbiology and Immunology, Pathology, Pharmacology, Physiology, Zoology, and several departments in the School of Medicine.

Students seeking the Ph.D. in one of the participating Graduate School departments may make initial application to either the program or one of the departments. All who apply directly to the program will be considered for admission by the program and the department of the student's choice. Students who apply initially for graduate study in one of the departments may also be nominated by that department for admission to the program. It is expected that most students will have a strong undergraduate preparation in mathematics and the physical and biological sciences with demonstrated excellence of performance as judged by grades in course work and letters of recommendation from former instructors.

All students in the program will take a series of courses in toxicology as well as courses specified by his or her department. A student will be expected to choose a dissertation adviser in his or her department at least by the end of the first two semesters in the program, and will normally be expected to begin dissertation research during the third semester in residence. Upon satisfactorily completing all degree requirements in the program and in the department, students will be jointly recommended for the Ph.D. degree.

Further information may be obtained from the Director of the toxicology program (Department of Biochemistry).

Zoology

Professor Nicklas, *Chairman* (227 Biological Sciences); Professor H. Wilbur, *Director of Graduate Studies* (129 Biological Sciences); Professors Barber, Costlow, Fluke, Gillham, Klopfer, Livingstone, Schmidt-Nielsen, Staddon, Tucker, Vogel, Wainwright, and Ward; Associate Professors Forward, Lundberg, McClay, H. Nijhout, Rausher, and Sutherland; Assistant Professors Conner, M. Nijhout, Roth, and Uyenoyama; Professors Emeriti Bailey, Bookhout, Gregg, and K. Wilbur; Adjunct Professor Schmidt-Koenig

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking the Ph.D. degree. The A.M. degree may be taken by students en route to the Ph.D., or by those who leave the doctoral program. Ordinarily, only students seeking the doctorate are admitted to the department.

In general, students entering the department will be equipped to pursue advanced degrees if they have completed an undergraduate major in biology along with some formal training in college level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in both the *Bulletin of Duke University: Undergraduate Instruction* and the *Bulletin of Duke University: Graduate School* for information about the intellectual resources of the University. Special attention should be given to announcements of the Departments of Anatomy, Anthropology, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Pharmacology, Philosophy, Physiology, Psychology, Sociology, and Zoology; announcements of the Schools of Engineering and Forestry and Environmental Studies should also be consulted.

For Seniors and Graduates

The L suffix on a zoology course number indicates that the course includes a laboratory.

201L. Animal Behavior. Physiological and developmental studies. Laboratory emphasizes research projects. Prerequisites: physiology and genetics or consent of instructor; evolution recommended. 4 units. *Klopfer*

203L. Marine Ecology. Application of ecological theory to marine systems. Mathematical properties of population growth and species interactions; field and laboratory projects with computer-assisted analysis of data. Practice in scientific writing. Readings from current scientific publications. Prerequisites: introductory biology or invertebrate zoology and calculus; knowledge of statistics recommended. Offered at Beaufort. C-L: Marine Sciences 203L. 6 units. *Sutherland*

204L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and week-end field trips. Prerequisites: an introductory ecology course and consent of instructor. 4 units. *Christensen (botany) and Wilbur*

215L. Primary Productivity in the Seas. Prerequisites: introductory biology and chemistry. Offered at Beaufort. C-L: Botany 215L. 4 units. *Barber and Ramus*

216L. Limnology. Lakes, ponds, and streams: their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal com-

munities. Laboratory includes field trips. Offered biennially. Prerequisites: introductory biology and Chemistry 12 and physics and Mathematics 32 or consent of instructor. 4 units. *Livingstone*

222L. Entomology. The biology of insects: diversity, development, physiology, and ecology. Field trips. Prerequisite: introductory biology. 4 units. *H. Nijhout*

226L. Ichthyology. Diversity, evolution, natural history, and ecology of fishes. Laboratory includes overnight field trips to marine and freshwater habitats. Prerequisites: introductory biology and Zoology 108L or equivalent. 3 units. *Lundberg*

233. Principles of Insect Behavior. Processes governing the behavior of animals as illustrated by insects. Neural integration, communication, genetics, ecology, and evolution of individual and social behavior. Invertebrate zoology or entomology recommended. 3 units. *Conner and Rausher*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Botany 237L. 3 units. *Lundberg and Mishler (botany)*

244. Principles of Immunology. Prerequisites: Zoology 160 and Chemistry 151. C-L: Microbiology and Immunology 244. 3 units. *McClay and Whisnant (microbiology and immunology)*

247S. Photobiology. Effects of visible light and of ultraviolet and near ultraviolet radiation in living systems: repair processes, quantum processes, physical optics. Prerequisites: college physics and introductory biology. 3 units. *Fluke*

249. Biomechanics. Principles of fluid and solid mechanics applied to biological systems. Prerequisites: Physics 51 and Mathematics 31 or equivalents. 3 units. *Vogel and Wainwright*

250L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. C-L: Marine Sciences 250L. 4 units. *Forward*

258L. Laboratory Research Methods. Radioactivity and scintillation counting, spectrophotometry and enzyme kinetics, protein and cell component separatory methods, other analytical methods, according to individual research interests. Prerequisite: consent of instructor. 4 units. *Fluke and staff*

259L. Laboratory in Biomechanics. Introduction to instruments used in investigations of solid and fluid biomechanics. Exercises and individual projects. Prerequisite: Zoology 249. 3 units. *Vogel and Wainwright*

261. Biology of Parasitism. How parasites, from viruses through vertebrates, have solved the special problems associated with their dependence on other organisms. Prerequisites: Zoology 74L and 160. 3 units. *M. Nijhout*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, Microbiology and Immunology 269, and the University Program in Cell and Molecular Biology. 3 units. *McClay and staff*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips included. Not open to students who have had Zoology 176. Prerequisite: introductory biology. Offered at Beaufort. C-L: Marine Sciences 274L. 6 units. *Staff*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. Offered at Beaufort. C-L: Marine Sciences 278L. 6 units. *McClay and visiting staff*

280. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisites: introductory biology and Chemistry 12 and Mathematics 31 or equivalents. C-L: Botany 280 and Genetics—The University Program. 3 units. *Antonovics (botany), Boynton (botany), and Gillham*

286. Evolutionary Mechanisms. C-L: Botany 286 and Genetics—The University Program. 3 units. *Antonovics (botany), Uyenoyma, and Wilbur*

287. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Botany 287. 3 units. *Mishler and Roth*

288. Mathematical Population Genetics. Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating systems, sex ratio, stochastic processes. Prerequisite: Calculus; statistics and linear algebra recommended. C-L: Genetics—The University Program. 3 units. *Uyenoyama*

293L. Population Biology. C-L: Botany 293L. 3 units. *Wilbur and Antonovics (botany)*

295S, 296S. Seminar. Topics, instructors, and course credits announced each semester. C-L: Marine Sciences. *Staff*

For Graduates

353, 354. Research. To be carried on under the direction of the appropriate staff members. Hours and credit to be arranged. C-L: Marine Sciences 353, 354. *Staff*

360, 361. Tutorials. An approved academic exercise, such as writing an essay or learning a research skill, carried out under the direction of the appropriate staff members. Hours and credit to be arranged. *Staff*

COURSES CURRENTLY UNSCHEDULED

252. Comparative Physiology

355, 356. Seminar

RELATED PROGRAMS

Cell and Molecular Biology, The University Program. See announcement in this bulletin.

Genetics, The University Program. Genetics courses offered by the Department of Zoology are part of the University Program in Genetics; see announcement in this bulletin.

Marine Sciences, The University Program. Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Latin America. Refer to the section Organization for Tropical Studies in this bulletin in the chapter "Special and Cooperative Programs."

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The information in this bulletin applies to the academic year 1985-86 and is accurate and current, to the extent possible, as of August 1984. The University reserves the right to change programs of study, academic requirements, teaching staff, the calendar, and other matters described herein without prior notice, in accordance with established procedures.

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University Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*

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Dean Thomas F. Keller

The Fuqua School of Business Calendar

1985

August		
21-23		Orientation and registration
26*		Fall classes begin
September		
2		Labor Day—Classes in session
October		
14-15*		Fall break
November		
25-29		Thanksgiving break
December		
10		Classes end
11-17		Examination period

1986

January		
6		Classes begin
March		
3-7		Spring break
April		
18		Classes end
21-26		Examination period
May		
4		Commencement


*Dates of the 1985-86 calendar are subject to change by the Provost of Duke University during the 1984-85 year.

A Message from the Dean

In his indenture establishing Duke University, James Buchanan Duke stated his desire that the University excel in the teaching of medicine, religion, and business. The Board of Trustees of Duke University, in 1969, established the Graduate School of Business Administration with a mandate to provide programs in management education of the highest quality. In 1980 the school was renamed to honor J. B. Fuqua of Atlanta, Georgia, who is a member of both the University's Board of Trustees and the school's Board of Visitors. Mr. Fuqua has supported the school through his generosity and his participation in its programs.

The mission of the Fuqua School of Business is to enhance the practice of management through education and research. Our approach is to prepare men and women to meet their career opportunities with a strong educational background and with an awareness of the need for initiative and leadership when faced with business challenges. We seek students who possess high academic standards and who also demonstrate the ability to think creatively. These are important qualities for business leadership and are reflected in the orientation of our entire program. As a school, we are committed to retaining our flexibility and our responsiveness to management needs as they arise in the business community.

Our heritage at Duke is a tradition of excellence in education. At the business school we have built on this heritage to develop programs which will enable graduates to meet the challenges of leadership in business, government, and educational organizations.

A handwritten signature in cursive script, reading "Thomas F. Keller". The signature is written in dark ink and is positioned above the printed name and title.

Thomas F. Keller
Dean

General Information



Duke University

In 1839 a group of citizens from Randolph and adjacent counties in North Carolina assembled in a log schoolhouse to organize support for a local academy founded a few months earlier by Brantley York. Prompted, they said, by “no small share of philanthropy and patriotism,” they espoused their belief that “ignorance and error are the banes not only of religious but also civil society which rear up an almost impregnable wall between man and happiness.” Union Institute, which they then founded, was reorganized first in 1851 as Normal College to train teachers, and eight years later as Trinity College, a liberal arts college, which later moved to the growing city of Durham, North Carolina. With the establishment of the James B. Duke Indenture of Trust in 1924, Trinity College became Duke University. Today, Duke is a two-campus institution with a student body of about 9,000, of whom 3,000 are enrolled in the graduate and professional programs. Established in 1969, the Graduate School of Business Administration joined the Schools of Medicine, Nursing, Law, Engineering, Divinity, and Forestry in preparing qualified individuals for professional leadership and developing excellence in education for the professions.

The Campus. The main campus (West) of Duke University is a beautifully designed complex of buildings in Gothic architecture, bordered on the east by the Sarah P. Duke Gardens and on the west by the 8,000-acre Duke Forest. This campus is dominated by the Duke Chapel, whose 210-foot-high tower houses a 50-bell carillon. The William R. Perkins Library is one of the largest research libraries in the country. The new facility for the Fuqua School of Business is located on West Campus near the intersection of Science Drive and Towerview Drive. The East Campus is a smaller complex of Georgian-style buildings and has, as major points of interest, the Duke University Museum of Art and the Mary Duke Biddle Music Building.

Durham is a part of the Research Triangle, an area formed by Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University at Raleigh. The Research Triangle Park, a 5,400-acre campus for research laboratories, governmental agencies, and research-oriented industries, is recognized as one of the world’s leading science centers. Durham, located near the center of the state, has easy access to the Great Smokies of the Appalachian Mountains and to the scenic and historic beaches of the Outer Banks. The area offers varied cultural and recreational activities ranging from concerts, opera, dance, theater, and recitals to intramural and collegiate sports, boating, skiing, camping, and other outdoor activities.

The Fuqua School of Business. Recognizing the importance of business education, Duke University’s Board of Trustees established the Graduate School of Business

in 1969, with the mandate to provide management education programs of the highest quality. The school began with two programs; an undergraduate major in management science, and a fledgling M.B.A. Program that graduated its first class of twelve students in 1972. Since that time, the school has grown to include five major academic programs, a faculty of fifty-three, and over 500 masters degree candidates enrolled in daytime and executive M.B.A. programs. The school also offers a wide range of non-degree executive education programs and seminars.

J. B. Fuqua, Chairman of Fuqua Industries, Atlanta, Georgia, has supported the school generously in its development. In honor of Mr. Fuqua's contribution to the school and personal participation in its growth, the school was renamed the Fuqua School of Business in 1980 by proclamation of the Board of Trustees.

In January of 1983, the Fuqua School of Business moved into its new building on Science Drive on Duke University's West Campus. This building, designed by Edward Larrabee Barnes, offers one of the finest settings for management education in the United States. The 140,000 square feet of space provides for the instruction of M.B.A. students in a variety of degree programs as well as for year-round executive education programs.

The building is constructed in two wings. One wing, primarily designed for M.B.A. education, includes six amphitheatre-style classrooms, the 500-seat Harold S. Geneen Auditorium, a library completely devoted to management education, and numerous seminar and breakout rooms. The second wing is devoted to executive education, and features the R. J. Reynolds Executive Auditorium, dining and lounge facilities, and small group meeting rooms.

Resources of the University

The Library System. The libraries of the University consist of the Perkins Library and its eight branches on campus: Biology-Forestry, Chemistry, Divinity, the East Campus Library, Engineering, Music, Physics-Math, and the Undergraduate Library; and the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort. Also located on West Campus are the Law Library and the Medical Center Library and Communications Center. In June 1980, these libraries contained approximately 3,218,000 volumes and ranked nineteenth in size among academic libraries in the United States. More than 10,000 periodicals, 11,000 serials, and 150 newspapers are received regularly. The collection includes about 7,450,000 manuscripts, 82,000 maps, 39,000 sheets of music, and 651,000 rolls or sheets of microtext.

The William R. Perkins Library. The William R. Perkins Library—the main library of the University—houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The newspaper collection, with 46,644 reels of microfilm, has several long eighteenth-century files, strong holdings of nineteenth-century New England papers and antebellum and Civil War papers from North Carolina, South Carolina, and Virginia, as well as many European and Latin American papers. The manuscript collection of approximately five million items is particularly strong in all phases of life in the South Atlantic region. It also includes significant papers in English and American literature. The rare books collection contains materials covering a broad range of fields, and the Latin and Greek manuscripts constitute one of the outstanding collections in the United States. The collection of Confederate imprints is the largest in the country.

Tours of the Perkins Library are given frequently during orientation week and upon request throughout the year. Information about other campus libraries may be

obtained from the staff in each of the libraries. Handbooks about library services and facilities are also available in each of the libraries.

Fuqua School of Business Library. Organized and established in January, 1983, the Fuqua School of Business Library supports the basic research and teaching of the Fuqua School. As a working collection, the library's materials and services are tailored to the needs of the students and faculty of the Fuqua School. When complete, the library will house 50,000 volumes, 300 current periodical subscriptions, a comprehensive business reference collection, as well as special collections, including annual and 10K reports on microfiche, computer software and documentation, and a working paper collection. Library services include computer-assisted research, a cooperative interlibrary loan program with neighboring universities, and an SDI (Selective Dissemination of Information) service. To assist M.B.A. students, librarians are available business hours Monday through Friday, while M.B.A. students trained in library research are available to assist library users during the evenings and on weekends.

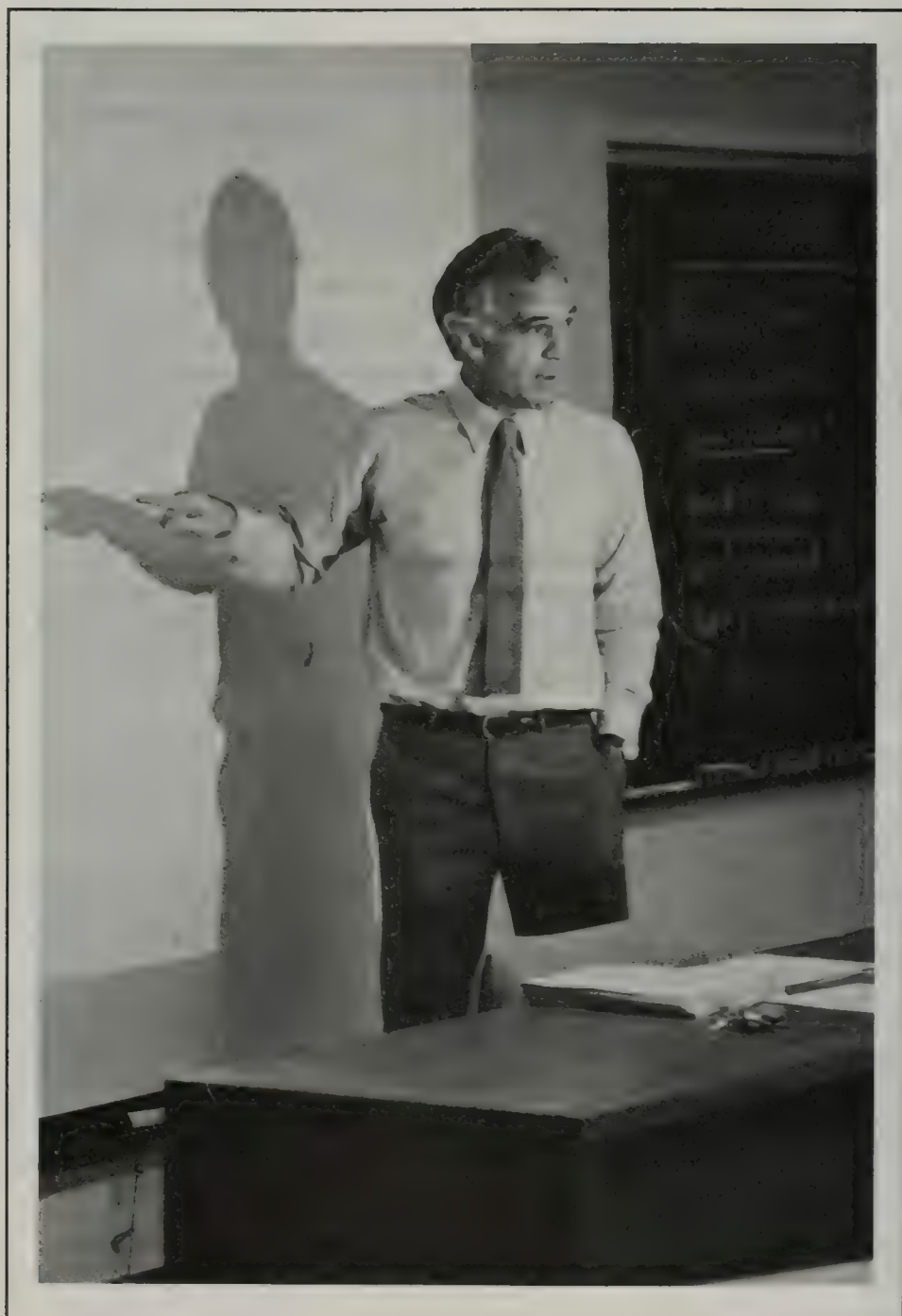
During orientation week, the library has regularly scheduled orientation tours covering the library's collections and services. In addition, faculty and students may request library instruction tailored to a specific problem.

Computation Center. The Duke University Computation Center provides the University faculty and students with a facility for research and instruction. The center is presently equipped with an IBM 370/158 computer with 6,144 bytes of memory, four 3330-II disk drives, twelve 3350 disk drives, six tape drives, two card readers, a card punch, four printers, and a digital plotter which is connected by a high-speed microwave link to one IBM 3081 (with sixteen million bytes of memory, multiple 3330- and 3350-type disk facilities, thirteen tape drives, drums, card readers, and printers) located in the Research Triangle Park at the Triangle Universities Computation Center (TUCC), a nonprofit corporation formed jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. TUCC also has two Hewlett-Packard 2000F computers which provide BASIC interactive computing. Duke has four medium-speed terminals (card reader and printer), located in the Engineering Building, the Biological Sciences Building, and the Sociology-Psychology Building, and on East Campus, as well as several other low-speed keyboard terminals, connected to TUCC.

All users of the Computation Center facilities are urged to obtain funds to pay for computer services. Users unable to obtain grant funding may ask for financial support from their departments when applying for services. More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center.

Fuqua School of Business Computer Education Center. Ever since the first architectural sketch of the building was drawn, the concept of an electronic business school has been at the leading edge of planning for the Fuqua School. The goal was a total computer network, and the dream was realized when the Computer Education Center opened in the fall of 1983. The foundation of the school's new electronic environment is a three-year joint study with the IBM Corporation. Within the framework of this study, the Fuqua School faculty and students will use two IBM mainframes (the System/38 and the 4341) and 42 IBM personal computers to develop new curriculum materials and integrate computerized decision support systems into the M.B.A. educational programs. Classrooms, team rooms, the auditoriums, library, and faculty and staff offices have been constructed to facilitate this technological revolution.

Programs of Study



The Master of Business Administration Program

The Duke M.B.A. Program prepares individuals for challenging management jobs in the private sector. The program emphasizes the understanding and application of analytical tools and concepts drawn from a broad array of management fields of inquiry. The student is asked to structure unstructured situations and to propose solutions to complex problems. By studying analytical tools, theories, and examples, the student learns to identify the common threads in seemingly different business situations and to grasp the essential nature of unfamiliar management problems.

The teaching styles adopted by the faculty vary. In some courses, lectures are the rule. In others, the case method predominates. In still others, there is a mix of many styles, including role playing and student presentations. Depending on the course, the work done outside of class is likely to consist of (1) reading texts or articles, (2) working problem sets, (3) researching and writing papers, or (4) preparing cases and discussing them in small study groups.

The school has made a deep commitment to the use of the computer in business education. Students are required to master word processing, spread-sheet programs, and some statistical packages on IBM Personal Computers. A number of courses require the use of these newly developing managerial skills. Likewise, the school is also committed to improving the communications skills of its students. The business communications curriculum does not stand by itself, but has been carefully integrated into other course work.

In these ways and others, the school is determined to stay in the forefront of business education.

OUTLINE OF THE CURRICULUM

The M.B.A. degree requires four semesters of full-time work totaling 63 units of graduate course credit. On occasion, students who are exceptionally proficient in a particular subject will be allowed to substitute advanced course work for one or more core courses. There are no summer sessions for students in the M.B.A. program.

Modern management often requires analytical reasoning which focuses on precise statements of relationships between variables. In contemplating the future, concepts of probability become especially important. For these and other reasons much of our course work assumes a firm grasp of mathematical concepts. We strongly encourage each applicant to come prepared with the necessary background. A working knowledge of calculus is essential. Evidence of this preparation is required for admission.



The First-Year Program. Course work in the first year is designed to provide the basic knowledge and tools of analysis for the operations of business organization. In the second semester of the first year, students are introduced to the functional areas of the firm. The first-year program includes:

Fall Semester

BA 300	Managerial Economics	3 units
BA 311	Statistical Analysis for Management	3 units
BA 312	Quantitative Analysis for Management	3 units
BA 320	Organization Behavior	3 units
BA 330	Financial Accounting	3 units
BA 318	Computer Laboratory	1 unit
		<hr/>
		16 units

Spring Semester

BA 301	Economic Environment of the Firm	3 units
BA 331	Managerial Accounting	3 units
BA 350	Financial Management	3 units
BA 360	Marketing Management	3 units
BA 370	Operations Management	3 units
BA 388	Business Communications	2 units
		<hr/>
		17 units

The Second-Year Program. The second year of the M.B.A. program consists of one required course and nine electives. The required course, BA 340, Business Policy

and the Management Experience, stresses the application of knowledge gained in the first year to the overall management process, to the integration and coordination of various functions, and to strategy formulation and implementation. One feature of the course is the play of a management game. The game places teams of students in key management positions of firms which compete in a simulated market environment. Student teams are responsible for the organizational structure and decision making in marketing, production, finance, and personnel. Each student team reports to a board of directors composed of faculty and business executives from the community.

The nine electives allow the students to develop additional depth in functional areas and freedom to concentrate their studies in a specific area of interest. Of the elective courses, one must be chosen from the environmental field which deals with the managerial implications of the economic, legal, social, and political environment of the firm. The courses satisfying this requirement are BA 302, BA 342, and BA 345. Students enrolled in the M.B.A./J.D. program are exempt from this requirement. The student may also elect up to four courses from other graduate and professional schools at Duke, or neighboring institutions in a reciprocal agreement with Duke. This allows the development of an individual program consistent with career goals.

The second-year program includes:

Fall Semester

BA 340	Business Policy and the Management Experience	3 units
	Electives	12 units
		<hr/> 15 units

Spring Semester

Electives	15 units
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M.B.A. with an Accounting Concentration

The M.B.A. degree with a concentration in accounting can be pursued by all students who are accepted into the Fuqua School of Business. This concentration provides the requisite background to sit for the certified public accounting examination, while also providing the necessary educational foundation needed for effective performance in either private or public accounting settings. The purpose of the program is to produce managers who are prepared to meet the emerging challenges faced by the professional accountant in industry, commerce, financial institutions, government, and public accounting.

The concentration in accounting requires candidates to pursue both a rigorous technical core in accounting as well as the regular core program taken by all candidates for the M.B.A. degree. Prerequisites for students to be accepted into the accounting concentration upon admission are the equivalent of Duke's Financial Accounting (BA 330) and Managerial Accounting (BA 331). These courses should be completed before entering the Fuqua School of Business, thus enabling the entering student to study more advanced topics in the accounting core during the first year. Those who do not have these necessary prerequisite courses may pursue them in the first year of the M.B.A. program, thus delaying their entrance into the accounting concentration until the second year.

The program requirements for the M.B.A. degree with a concentration in accounting for those who enter with the necessary prerequisites are, for the first year:

Fall Semester

BA 300	Managerial Economics	3 units
BA 311	Statistical Analysis for Management	3 units
BA 312	Quantitative Analysis for Management	3 units
BA 320	Organization Behavior	3 units
BA 430	Financial Accounting Standards and Analysis I	3 units
BA 318	Computer Laboratory	1 unit
		<hr/> 16 units

Spring Semester

BA 301	Economic Environment of the Firm	3 units
BA 431	Financial Accounting Standards and Analysis II	3 units
BA 350	Financial Management	3 units
BA 360	Marketing Management	3 units
BA 370	Operations Management	3 units
BA 388	Business Communications	2 units
		<hr/> 17 units

The second-year program includes:

Fall Semester

BA 340	Business Policy and the Management Experience	3 units
BA 446	Federal Income Taxation	3 units
	Electives	9 units
		<hr/> 15 units

Spring Semester

BA 436	Internal Control, Auditing, and Information Systems Analysis	3 units
BA 345	Legal environment of the Firm	3 units
	Electives	9 units
		<hr/> 15 units

At least one of the elective courses must be taken from the following: BA 432, BA 433, BA 435, BA 437, BA 438.

The Doctor of Philosophy Program

The Ph.D. in Business Administration Program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results. Students are introduced at the outset of the program not only to rigorous course work, but also to the research activities of the faculty and of other students. (A ratio of doctoral students-in-residence to faculty of less than one to one facilitates this opportunity to work closely with faculty.)

The program requires that doctoral candidates must acquire expertise in three disciplines: economics, behavioral science, and quantitative methods. In addition,

each candidate must acquire knowledge at the M.B.A. level of at least three of the following functional areas: accounting, finance, marketing, and operations management. Competence in the three disciplines and the functional areas may be gained from the student's choice of course work, participation in seminars, and independent study. Each student takes a comprehensive exam at the end of the second year or the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires three to four years of work beyond the bachelor degree. Students entering the program with an M.B.A. or other advanced work will usually be able to reduce the time in residence by a year. The student and his/her faculty committee determine the specific program of study, subject to the approval of the Director of the Doctoral Program.

The Ph.D. program currently emphasizes research and training in the areas of marketing, behavioral sciences and organizational theory, finance, accounting and quantitative methods, operations management, and regulatory economics. Other areas of emphasis will be developed as faculty are added to the staff of the Fuqua School of Business.

It is the policy of the school to provide research assistantships or fellowships to all new Ph.D. students. The school normally continues to provide financial support for up to thirty-six months as long as the student continues to make satisfactory progress toward the Ph.D.

The Ph.D. in business administration is a degree of the Graduate School of Duke University. Application forms should be obtained from and returned to the Director of Admissions, The Graduate School, Room 127, Allen Building, Duke University, Durham, North Carolina 27706.

Special Programs

CONCURRENT DEGREE PROGRAMS

The Fuqua School of Business offers combined degree programs with the School of Law, the School of Forestry and Environmental Studies, and the Institute of Policy Sciences and Public Affairs. By recognizing certain areas of study common to the M.B.A. and each of the other advanced degrees, duplication of instruction is eliminated and students are able to obtain the concurrent degrees in less time than would normally be required to obtain the two degrees separately. Students are normally required to take 51 units of business administration course work following admission to the program.

The M.B.A.–J.D. The concurrent M.B.A.–J.D. program requires four academic years of study with a full year in each school and two years of combined study that meets the requirements for both the M.B.A. and J.D. degrees. Students must apply for admission and be accepted by both the School of Law and the Fuqua School of Business. Additional information on the program may be obtained from the Director of Admissions, the Fuqua School of Business, Duke University, and the Admissions Office, Duke University School of Law.

The M.B.A.–M.F. and the M.B.A.–M.E.M. The concurrent Master of Business Administration and Master of Forestry or Master of Environmental Management degrees normally require three years of study. Students must apply for admission and be accepted by both the School of Forestry and Environmental Studies and the Fuqua School of Business. Additional information on the program may be obtained from the Director of Admissions, the Fuqua School of Business, Duke University, and the Director of Admissions, Duke University School of Forestry and Environmental Studies.

The M.B.A.–A.M. in Public Policy Sciences. The concurrent Master of Business Administration degree and Master of Arts degree in Public Policy Sciences normally

requires two and a half to three years of study. The joint degree curriculum requires a minimum of thirty credits to be specified by the Institute of Policy Sciences and Public Affairs, and fifty-one credits to be specified by the Fuqua School of Business. Students must apply to and be accepted by both the Fuqua School of Business of Duke University and the Graduate School of Duke University. Additional information may be obtained from the Director of Admissions, the Fuqua School of Business, Duke University, and the Director of Graduate Studies, Institute of Policy Sciences and Public Affairs.

Public Policy Option. For those students interested in management careers in the public or not-for-profit sectors the Fuqua School of Business offers a public policy option. This option consists of a recommended set of M.B.A. elective courses to be taken in the Institute of Policy Sciences and Public Affairs. Students interested in pursuing this option must obtain the consent of the institute's faculty adviser of M.B.A. students and the consent of the M.B.A. program director.

COMBINED UNDERGRADUATE-PROFESSIONAL DEGREES

Also known as the "three-two" program, the combined undergraduate-professional degree program provides that the Bachelor of Science or Bachelor of Arts degree may be awarded to students who successfully complete three years in an approved curriculum in arts and sciences at Duke and also the first year of study for the Master of Business Administration. After two years at Duke and before transfer to the Fuqua School of Business, students may apply for the three-two program through their academic dean. To be eligible for the combined program a student must successfully complete all baccalaureate requirements (except eight elective courses) and be admitted to the business school. Upon satisfactory completion of the first two semesters in the Fuqua School of Business, the student will be awarded a baccalaureate degree. The M.B.A. degree is awarded upon completion of the second year of the program.

EXECUTIVE M.B.A. EVENING PROGRAM

The Fuqua School of Business offers an M.B.A. degree for managers in the greater Raleigh-Durham area. The program is designed for those who are seeking a broad educational base as preparation for more senior managerial positions, while continuing full-time job responsibilities. Major objectives of the program are to improve decision-making and management skills, and the effective utilization of these skills in resolving contemporary management problems.

The Executive M.B.A. Evening Program requires twenty-five months of study and includes six semesters of course work. Students interested in the program should contact the Director of the Executive M.B.A. Evening Program or the Director of Admissions, Fuqua School of Business, Duke University.

EXECUTIVE M.B.A. WEEKEND PROGRAM

The Fuqua School of Business also offers an Executive M.B.A. Weekend Program. The program is tailored to fit the schedule of the fully employed business executive who wishes to complete an M.B.A. degree without career interruption. It offers mature executives a broad perspective on general management responsibilities and includes the tools, concepts, and strategies required for senior leadership.

The Executive M.B.A. Weekend Program begins with an orientation program, and then meets Friday-Saturday every other weekend. The program requires twenty months of study and includes five semesters of course work. Students interested in the program should contact the Director of the Executive M.B.A. Weekend Program or the Director of Admissions, Fuqua School of Business, Duke University.

EXECUTIVE EDUCATION

The Fuqua School of Business offers various executive development programs. These nondegree programs are designed to meet the needs of business organizations and their executives. The courses vary in length from a few days to four weeks and are tailored to the requirements of the participating group. The programs are usually residential, giving participants maximum involvement with each other and with the faculty. Major programs include a four-week Advanced Management Program and two-week programs in Strategic Human Resources Management and Strategic Production Management. Other recent offerings have included programs in cash management, management science in banking, management of technology and innovation, and management of capital expenditures.

Further information on the school's executive development programs may be obtained from the Assistant Dean for Executive Education, Fuqua School of Business, Duke University.

Admissions



Admissions

Anyone who holds a bachelor's degree from an accredited college or university is eligible to apply for admission to the Fuqua School of Business. No specific undergraduate major is deemed preferable to any other; however, the programs have been designed primarily for persons with training in the liberal arts, engineering, or the sciences. The Admissions Committee seeks those candidates with leadership potential who are prepared to compete successfully in a demanding course of study which requires logical and analytical reasoning. All entering students are expected to have a working knowledge of calculus, and applications are reviewed closely for this ability.

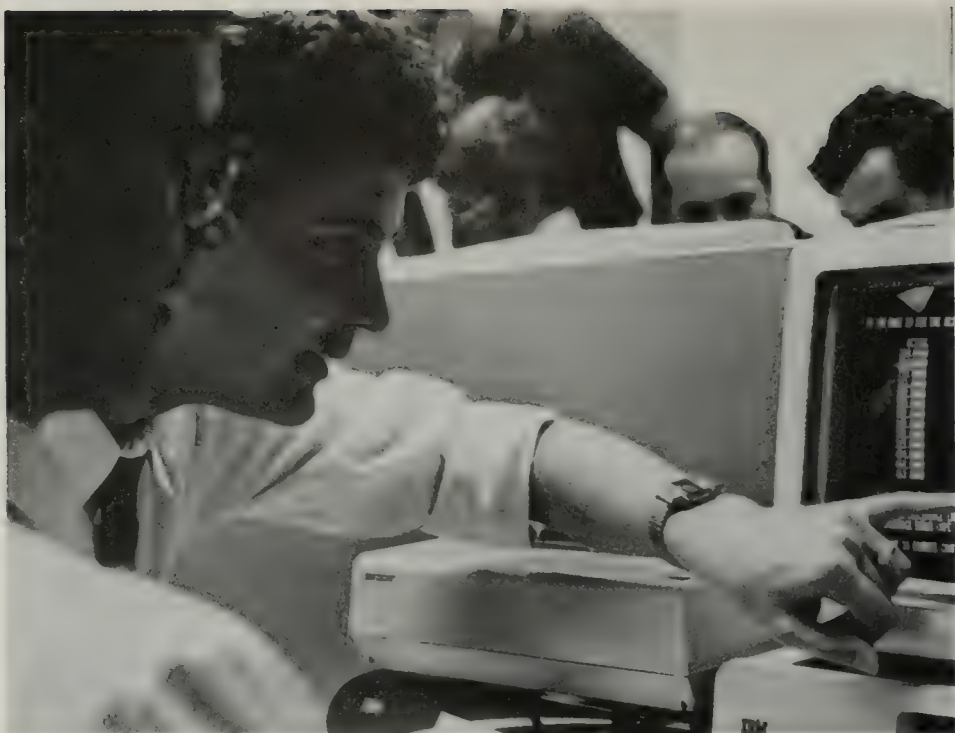
Prior work experience is not considered a requirement for the M.B.A.; however, the Admissions Committee recognizes the value of full-time work experience and considers it a positive factor in admission decisions.

Application Information. Complete instructions for filing an application are included with each application packet. Each applicant must submit the following to the Director of Admissions before action can be taken:

1. Application Form: Careful completion of the application will ensure a thorough evaluation. Since it is desirable that the application be as complete as possible, additional sheets should be used if necessary.
2. College Transcripts: An official transcript from each of the colleges *attended* must be sent to the Director of Admissions. Students who apply during their senior year must ensure that a final transcript be received by the business school prior to enrolling.
3. Letters of Recommendation: Three letters of recommendation are required and must be sent to the Director of Admissions. Recent graduates or those in their senior year should have at least two letters submitted from persons familiar with their academic ability.
4. Graduate Management Admission Test: Score reports must be sent directly from the Educational Testing Service to the Fuqua School of Business.
5. Application Fee: A nonrefundable fee of \$35 to cover processing must be submitted with the application.

Any questions or requests for application materials should be addressed to the Director of Admissions, The Fuqua School of Business, Duke University, Durham, North Carolina 27706.

Application Deadline. A continuous admissions policy is followed in the Fuqua School of Business in that admission decisions are made as applications are com-



pleted. Generally, applications will be reviewed and given a decision approximately six weeks after receipt. Application credentials should be on file in the school by April 1. The application file must be complete before action can be taken. A limited number of places in the class are available for applications completed after April 1; therefore, those wishing to apply after the normal deadline may do so.

Notification of Status. When the applicant has been accepted, a letter of admission and an acceptance form will be sent. A nonrefundable tuition deposit of \$200 will be required to reserve a place in the class. The process of admission is not complete until the statement of acceptance and the tuition deposit have been returned to the Director of Admissions.

Applicants notified of acceptance prior to April 1 will be expected to make the \$200 tuition deposit by April 15. Applicants notified of acceptance after April 1 will be expected to make the tuition deposit within two weeks of the notification, or the place in the entering class will be forfeited. It should be reiterated that the tuition deposit is in all cases nonrefundable.

Graduate Management Admission Test. The Graduate Management Admission Test, required of all applicants, is administered by the Educational Testing Service. Detailed information about the test and application forms may be obtained by writing directly to the Educational Testing Service, Box 966, Princeton, New Jersey 08540.

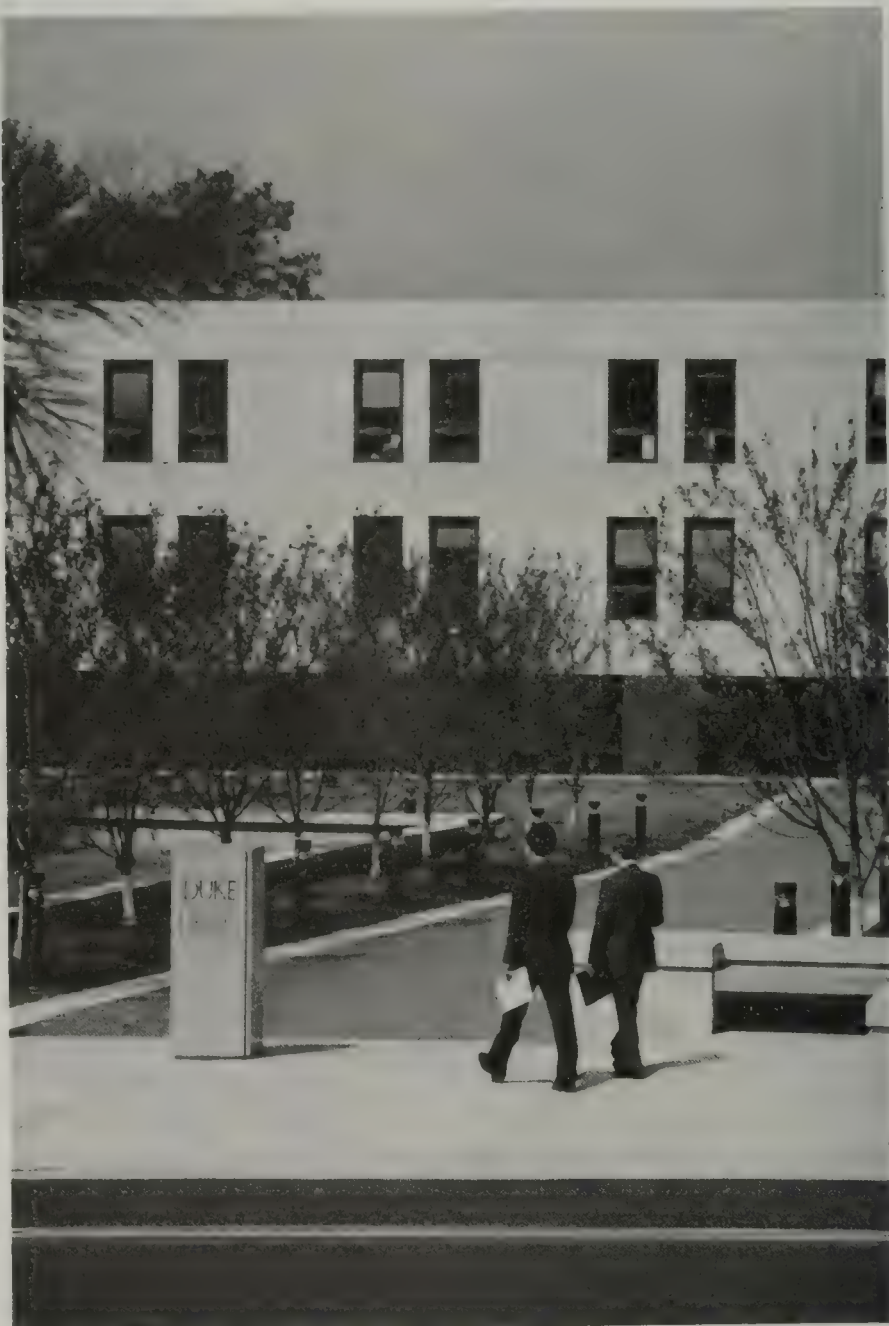
The examination is administered at many centers throughout the United States and abroad. Arrangements to take the test at an established center must be made four weeks before the test date (six weeks prior to test date at established foreign centers). The examination is given four times a year. Special centers may be arranged for persons distant from established centers. Requests for such accommodations must be made at least eight weeks prior to the selected test date. Applicants are encouraged to take the test in October or January; those taking the test in March or June run the risk of having the class already filled by the time scores are available.

Admission of Foreign Students. Fully qualified students from outside the United States are welcome at the Fuqua School of Business. In applying for admission, the foreign student should submit, in addition to the above credentials, the following:

1. If the native language is not English, the results of the Test of English as a Foreign Language (TOEFL) must be submitted. Most successful applicants score approximately 600 or better on the TOEFL.
2. A statement certified by a responsible person that finances are sufficient to maintain the student during the stay at Duke University. The University does not at the present have fellowship or loan programs for foreign students.
3. A statement by a qualified physician describing the physical and mental health of the applicant.

The M.B.A. program is a two-year program and all students are expected to complete the required course work in the allotted time period. Foreign applicants should be prepared to carry the normal course load as described earlier in the bulletin. For this reason, applicants whose native language is not English should consider the merits of attending an intensive English language program or enrolling in summer school courses at a university in the United States prior to enrolling at Duke. Since the course work in the program will involve lectures, discussions, and group projects, a firm understanding of the language is required.

Financial Information



Tuition and Fees

The tuition for students in the Fuqua School for the year 1984-85 is \$4,650 per semester. All charges are due and payable at the times specified by the University and are subject to change without notice. A late registration fee of \$25 is charged any student not completing registration during the registration periods. An \$8 charge will be imposed for any student's check returned to the University unpaid.

After the beginning of classes, refunds will be made on a pro rata basis. Students may elect to have tuition charges refunded or carried forward as a credit for later study according to the following schedule:

1. Withdrawal before classes begin: full refund.
2. Withdrawal during the first or second week of classes: 80 percent.
3. Withdrawal during the third, fourth, or fifth week of classes: 60 percent.
4. Withdrawal during the sixth week: 20 percent.
5. Withdrawal after the sixth week: No refunds.

Tuition or other charges paid from grants or loans will be restored to those funds not refunded or carried forward.

If for any reason during the program, a student should find it necessary to request a reduction in the normal course load, this request will be reviewed by the Program Director. If the Program Director approves a reduction in the course load, the student has the right to request a corresponding reduction in his/her tuition charges. These requests will be considered only for those students for whom the course reduction will necessitate enrollment in the Fuqua School in excess of four semesters for M.B.A. students or six semesters for Executive M.B.A. students. Students receiving approval for a tuition reduction will be charged on a pro rata basis.

Payment of Accounts. Duke University does not have a deferred payment plan for tuition, fees, and other charges. Following first enrollment in the Fuqua School, monthly invoices are sent each student by the Bursar's office. As a part of the agreement of admission to Duke University a student is required to pay all invoices as presented. A late payment charge will be assessed for all charges not paid in full by the due date, and certain restrictions may be applied. All students are charged the student health fee and student accident and sickness insurance coverage unless they file properly completed and signed waivers in the Bursar's office by the invoice due date.

Late Payment Charge. If the total amount due on the student's invoice is not received by the Bursar by the invoice due date, a penalty charge will be accrued from

the billing date of the invoice. The late payment charge is assessed at a rate of the 1 1/3 percent per month (16 percent per annum) applied to the past due balance. The past due balance is defined as the previous balance less any payments and credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default if the total amount due is not paid in full by the due date. A student in default will not be allowed to receive a transcript of academic records, have academic credits certified, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

M.B.A. Association Student Activity Fee. All students are assessed a \$25 non-refundable fee to be used to support the activities of the M.B.A. Association.

Athletic Tickets. Athletic ticket books are available to graduate students. Purchase is optional, with payment due in the fall semester.

Vehicle Fee. Each student possessing or maintaining a motor vehicle at Duke University shall register it at the beginning of the academic year in the Duke Public Safety Office at 2010 Campus Drive. A student who acquires a motor vehicle and maintains it at Duke University after academic registration must register it within five calendar days after operation on the campus begins. Resident students are required to pay an annual fee for each motor vehicle.

At the time of registration of a motor vehicle the following documents must be presented: state vehicle registration certificate, valid driver's license, and a student identification card.

Transcript Fee. Students who wish to obtain copies of their academic records should direct requests to the registrar's office, 103 Allen Building. Ten days should be allowed for processing. A fee of \$1, payable in advance, is charged for each transcript copy.

Student Health Fee. All students are assessed a nonrefundable fee for the Student Health Service. The fee for 1984-85 is \$180 (\$90 per semester).

Student Accident and Sickness Insurance. The University has made arrangements for a Student Accident and Sickness Insurance Plan to cover all full-time students for a twelve-month period. For an additional fee a student may obtain coverage for a spouse and children. Although participation in this program is voluntary, the University requires all graduate students to be financially responsible for medical expenses above those covered by the University Student Health Program through the University Accident and Sickness Policy, a private policy, or personal financial resources. Students who have equivalent medical insurance or wish to accept the financial responsibility for any medical expense may elect not to take the Duke plan by signing a statement to this effect. *Each full-time student in residence must purchase this student health insurance or indicate the alternative arrangement.* The Student Accident and Sickness Insurance Policy provides protection twenty-four hours per day during the full twelve-month term of the policy for each student insured. Students are covered on and off campus, at home, while traveling between home and school, and during interim vacation periods. The term of the policy is from the opening day of school in the fall. Coverage, services, and costs are subject to change each year as deemed necessary by the University. The rates for 1984-85 are: student only—\$173 per year; and family plan (student, spouse, and children)—\$484 per year.

Living Expenses. The estimated living costs for the 1984-85 academic year are \$5,946 for a single student and \$9,578 for a married student. These estimates include room and board, and allowances for transportation and miscellaneous personal expenses.

Debts. No records are released until students have settled with the Bursar for all indebtedness. Failure to pay all University charges on or before the times specified by the University will bar the student from class attendance until the account is settled in full.

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

Financial Aid

The Fuqua School of Business endeavors to make it possible for qualified students to attend Duke even though their own resources may be insufficient. Financial aid is available in the form of fellowships and various loan programs. Applicants are expected to make use of personal savings, veterans' benefits, summer income, and loans from family and other outside resources prior to requesting aid.

The Fuqua School of Business Fellowships. Each year a number of fellowships are available to incoming students. In general, the criteria for selection are prior academic achievement, demonstrated qualities of leadership, involvement in extracurricular activities and professional accomplishments. The awards are for two years of graduate study, ranging from partial tuition to full tuition. Requests for fellowships should be filed no later than March 1 to receive full consideration.



Named Gift Fellowships. The following awards are among the named gift fellowships offered by the Fuqua School of Business.

Accounting Associates Fellowship. These fellowships were established in 1976 through the donation of the Accounting Associates, a partnership of Duke University accounting professors. These awards are given annually to M.B.A. students pursuing an interest in accounting.

Chicago Mercantile Exchange Scholarships. Two awards are made annually. Special consideration is given to qualified students who have a demonstrated interest in entrepreneurship or futures and options markets.

Conoco Scholarship. The generosity of the Conoco Chemical Company has enabled the Fuqua School to offer two scholarships to second year students who have excelled in the first year of the M.B.A. program. Preference is given to students with undergraduate degrees in chemistry or chemical engineering.

Junior Achievement Scholarships. A grant from the Little Family Foundation supports two awards annually having a stipend of \$5,000 each. These scholarships are given to persons who have participated actively in a Junior Achievement Company or who have worked as an adviser to a Junior Achievement Company. First preference is given to company participants who have two or more years of full-time work experience; second preference is given to advisers who have two or more years of work experience; and final preference is given to participants who do not have work experience.

Martin L. Black Fellowships. Established in 1974 through the gifts and donations of alumni and friends of Martin L. Black, Professor Emeritus and a faculty member in accounting at Duke for over forty years, these fellowships are awarded to M.B.A. students who plan to concentrate in accounting.

Mead Scholarship. These scholarships, established in 1977 by the donation of Mr. D. Richard Mead, Jr. (A.B., 1952), are given to students who, without such support, might otherwise not be able to afford the cost of continued graduate study.

P. Huber Hanes Scholarships. Established in 1939, through the donation of Mr. P. Huber Hanes, these scholarships are given annually to two Duke students admitted by the Fuqua School into the combined undergraduate-professional degree program (also known as the "three-two" program). One scholarship is given in the name of P. Huber Hanes and one is given in the name of P. Huber Hanes, Jr. These scholarships are given to students who have excelled academically and extracurricularly.

Wachovia Scholarships. These scholarships are awarded to students who show promise of academic excellence and leadership potential. They were established in 1975 by Wachovia Bank and Trust Company.

Loan Programs. The Fuqua School operates long-term loan programs and participates in the college work-study program. These programs are available to students who anticipate a need to supplement personal resources while attending school. Students who demonstrate need according to federal guidelines and information supplied on a Graduate and Professional School Financial Aid Service (GAPSFAS) form, are eligible to participate in these programs.

Guaranteed Student Loans (GSL). The Guaranteed Student Loan Program, sponsored by the U.S. Department of Education, enables graduate students who qualify on the basis of need to borrow up to \$5,000 per academic year. These funds may be borrowed directly from a bank, credit union, savings and loan association, or other participating lender. The current interest rate for new borrowers is 8 percent which is subsidized by the federal government while the student maintains full-time enrollment. The maximum repayment period is ten years with repayment beginning six months after graduation or the cessation of full-time enrollment.

Specific information regarding the operation of the program in the applicant's home state and necessary application forms may be obtained from local banks or state

agencies. Students with a certified need who are unable to secure a guaranteed loan from a financial institution in their home state may be granted a GSL loan through Duke University.

National Direct Student Loans (NDSL). The National Direct Student Loan (NDSL) program is a federally funded, campus-based aid program with funding being awarded on the basis of need. The NDSL program is a low-interest (5 percent) program which is fully subsidized by the federal government during the student's period of enrollment. Repayment of principal and the assumption of the 5 percent interest begin six months after the termination of enrollment on at least a half-time basis. Federal law limits graduate students to a maximum borrowing capacity of \$12,000, inclusive of undergraduate borrowing. These loans are awarded by the Financial Aid Office and are part of a student's loan package.

College Work-Study Program. The College Work-Study Program is a federally funded program which supports the employment of students while they are in school. Students must meet federal need standards to qualify for participation in this program. Under this program, a student's salary is paid jointly by the federal government and the Fuqua School. Funding from this program is available only for students employed by the Fuqua School. Students given work-study allocations are responsible for securing their own employment within the school. The school offers unlimited employment opportunities for interested students.

Financial Aid Application. Financial aid decisions are made as applications are completed, with the first awards being granted about March 15. All students applying for financial aid must complete the Financial Aid Application and a GAPSFAS form. The GAPSFAS application may be obtained from the Graduate and Professional School Financial Aid Service, Box 2614, Princeton, New Jersey 08540, and should be filed no later than February 1, in order to ensure its arrival at Duke by March 1. Applications completed by March 1, including receipt of the GAPSFAS, will be assured of full consideration for all available resources. Federal law requires verification of income data submitted prior to January 1. Students are therefore encouraged to delay GAPSFAS filing until after January 1. The GAPSFAS contains sections to be completed by the applicant, by the spouse or spouse-to-be, and by the applicant's parents. Applicants who have been claimed as dependents by their parents in the previous year or who will not be considered independent by federal standards must have the parents' questionnaire section completed.

Career Counseling and Placement



Career Counseling and Placement Office

Emphasis on Career Planning. The Office of Career Counseling and Placement initiates a comprehensive program of career planning early in the first year of study. It is recognized that students enter the program with varying degrees of career maturity depending on previous education and experience. Therefore, the career planning program is organized to meet a wide range of developmental needs.

Activities conducted by the placement office staff offer the student the opportunity to move through a logical progression beginning with self analysis, followed by preparation for placement and the summer job search, and finally focusing on sophisticated career decision making as it relates to the world of work. The methods used to deliver these services vary from individual advising sessions, small group and workshop participation, and required large group lectures and seminars.

In the self-analysis process, instruction will be given and materials will be used to allow the student to identify, qualify, and quantify individual skills, interests, and abilities in an in-depth manner. Once defined, these skills and abilities become the foundation for resume writing and the interviewing process.

Resumés and References. Much attention is given to the development of a solid set of credentials and the preparation of personal references. To assure resume construction, each student will attend an instructional session, participate in a resumé writing workshop, and receive individual critiques from placement professionals. Upon resumé completion, focus is shifted to developing strategies for the job search process beginning with the summer internship.

Summer Employment. The placement office offers opportunities for meaningful summer employment between the first and second year of study through corporate interviews on campus, corporate referrals to placement staff, and the development of individually guided strategies.

During the second semester, synthesis between students' skills, interests and abilities, and occupational and career choices will be encouraged. To accomplish this, an intensive multiple-session workshop for students interested in further career development and decision making will be conducted. Additionally, several panels utilizing area professionals and alumni will address a variety of career fields and skills, abilities, and experience needed to pursue those careers.

The culmination of the self analysis, job search, and decision-making activities followed by the summer internship should allow the student to begin the second year of study with well-developed career decisions prior to the ultimate job search. Since both summer and permanent on-campus recruiting occur only in the spring semester,



the office provides ample opportunity for student interface with the corporate community during the fall term.

Annual Job Fair. The Job Fair ranks high as a traditional favorite of Fuqua students. The fair provides an excellent opportunity for students and employers to discuss job prospects and career responsibilities in a relaxed and informal atmosphere. Second year students focus on specific careers with a preferred industry or company while the first year class usually gathers as much information as possible on career alternatives. As a result of the program, many students arrive at early decisions concerning their area of career interest. The maximum number of firms invited to participate in the Job Fair is limited to forty. While the types of firms represented is rather broad based, the modest size of the program enables students to focus intensely on one industry or sample several.

Special Interest Programs. Many employers prefer to talk with students about job opportunities in a smaller, more focused setting prior to their on-campus interviewing activities. The Special Interest Programs (SIPS) provide the ideal opportunity. Ordinarily, a firm hosts a light buffet of hors d'oeuvres and beverages. Most Special Interest Programs occur in the late afternoon in the Student Lounge. The format is very flexible and informal with the vast majority of employers preferring to open the meeting with a few prepared remarks, or an audio-visual presentation followed by a question and answer period. The program promotes a mutual give and take situation between students and employers.

The placement office also cosponsors programs and events in cooperation with student organizations. For example, the Black M.B.A. Organization and the placement office cosponsored a visit of the *New York Times*. Likewise, the International Club and the Placement Office hosted a visit of Procter & Gamble International Executives.

Professional Affiliations. The placement director is a member of the College Placement Council (CPC), the Middle Atlantic Placement Association (MAPA), and the Southern College Placement Association (SCPA), and regularly attends their meetings to stay abreast of recent developments in the placement field as well as maintain contact with regional and national employers. The placement office participates in the nationwide CPC Salary Survey which is a major source of comparative salary data for career planning.

1982-84 Participating Companies

Addmaster Corporation
Advocacy International
Air Products & Chemicals Co.
Allied Corporation
American Hospital Supply Corp.
American Medical International (AMI)
Arthur Andersen & Co.
Arthur Young & Co.
Aquanautics Corp.
AT&T Communications
AT&T Long Lines
BBD&O Inc.
Bank of New England
Bank of New York
Bank of Virginia
Bendix Corporation
Benton & Bowles, Inc.
Berliner Handels & Frankfurter Bank
Bill Communications
Blue Cross/Blue Shield of Florida

Borg Warner Chemicals
Booz, Allen & Hamilton, Inc.
Bristol-Meyers
Brown & Williamson Tobacco Co.
Burger King
Burlington Industries, Inc.
Burroughs Wellcome
Cameron-Brown Co.
Campbell Soup Co.
Canadian Imperial Bank of Commerce
Cannon Mills Co.
Carolina Power & Light Co.
CBS Columbia House
Charter Hills Hospital
Chase Manhattan Bank, N.A.
Chemical Bank
Chesapeake & Potomac Telephone Co.
CHR Associates
Chessie System
Ciba-Geigy Pharmaceuticals

Citizens & Southern National Bank
 Clindar
 Coca Cola Bottling Co. Consolidated
 Coca Cola USA
 Commerical Union Capital
 Compu-Serve
 Conoco Chemicals
 Continental Illinois Bank
 Control Data Corporation
 Coopers & Lybrand
 Corning Glass Works
 Cox Communications
 Crum & Forster Insurance Co.
 Cryovac (Division of W. R. Grace)
 Cullinet
 Cybernetics & Systems
 Data General Corporation
 DataPoint
 Delliotte Haskins & Sells
 Department of the Navy
 Diamond Shamrock
 Digital Equipment Company
 Drackektt Co.
 Duke Power Co.
 Duke University Telecom.
 E. F. Hutton & Co., Inc.
 E. R. Carpenter Co.
 Eastman Kodak
 Eli Lilly & Co.
 Eli Lilly & Co., (Elizabeth Arden Division)
 Emerson Electric Co.
 Equitable Bank, N.A.
 Equitable Life Assurance Society of the U.S.
 Ernst & Whinney
 Exxon Corporation
 F.B.I.
 Fails Management Institute
 Farm Fresh Foods
 Federal Express
 Federal Home Loan Bank of N.Y.
 Federal Reserve Bank
 Ferguson Enterprises
 First Home Federal Savings & Loan
 First National Bank of Boston
 First National Bank of Chicago
 First National Bank of Maryland
 First National Exchange Bank
 First Union National Bank
 Florida Power & Light Co.
 Frito-Lay, Inc.
 General Electric Co.
 General Electric Microelectronics Center
 General Foods Corporation
 General Mills, Inc.
 General Mills Restaurant Group
 General Motors Corporation (Detroit)
 General Motors Corporation (New York)
 General Telephone of Florida
 General Telephone of the Southeast
 Girard Bank
 Glaxo, Inc.
 Goldman, Sachs & Co.
 Greyhound Leasing Corp.
 Gulf Oil Corp.
 Hallmark Cards, Inc.
 Hardee's Food Systems, Inc.
 Harris Corporation
 Hay Associates
 Hartwick College
 Hazeltine Corp.
 HBO Services, Inc.
 Heinz, USA
 Hewlett-Packard
 High Point Arts Council
 IBM Corporation
 Integon
 Intel Corporation
 InterFirst Bank
 International Paper Co.
 Irving Trust Co.
 ITT, Gilfillan, Inc.
 ITT Telecom
 ITT World Headquarters
 Jelleff's
 John M. McCracken & Associates
 Johnson & Johnson, Inc.
 Kayser Roth Hosiery, Inc.
 Kidder Peabody & Co.
 L. F. Rothschild, Unterberg, Towbin
 Lazard Freres & Co.
 Legg Mason Wood Walker
 L'eggs Brands Direct Marketing Division
 L'eggs Products, Inc.
 Lehman Brothers, Kuhn Loeb
 Liberty Mutual Insurance Co.
 Lincoln First National Bank
 Manufacturers Hanover Trust Co.
 Marine Midland Bank, N.A.
 Marriott Corp.
 Martin Marietta Corp.
 Maryland State Government
 McDewitt & Street
 MCI Telecommunications
 McKinsey & Company, Inc.
 Mead Johnson & Co.
 Mechanics & Farmers Bank
 Mellon Bank, N.A.
 Merrill Lynch
 Metropolitan Life Insurance Co.
 Michelin Tire Corp.
 Microelectronics Center of North Carolina
 Milliken & Company
 Mobil Oil Corporation
 Morgan Guaranty Bank & Trust Co.
 Morgan Stanley & Co, Inc.
 Motorola, Inc.
 M. R. Bolin Advertising and Marketing, Inc.
 National Bank of Detroit
 NCNB Corporation
 NCR Corporation
 Needham, Harper & Steers
 New York State Electric and Gas Corporation
 North Carolina Biotechnology Center
 Northern Telecom, Inc.

Northwestern Bank
 N-Y Associates, Inc.
 Ormco/Division Sybron Corporation
 Oppenheimer & Co.
 Omnidata International, Inc.
 Orton/McCullough Crane Co.
 Pacific Telephone
 Paine Webber Mitchell Hutchins
 Pearl, Pressman, Liberty Printers
 Peat, Marwick, Mitchell & Co.
 Pennsylvania Power & Light Co.
 Pepsi Cola Co.
 Personnel Research Inc.
 Peters & Company Securities
 Pfizer, Inc.
 Philadelphia National Bank
 Philip Morris USA
 Pinkerton Tobacco Co.
 Pittsburgh National Bank
 Price Waterhouse
 Procter & Gamble Co.
 Prudential-Bache Securities
 Prudential Life Insurance Co. of America
 Quaker Oats Co.
 Realty Advisory Services, Inc.
 R. J. Reynolds Industries, Inc.
 R. R. Donnelley
 Republic Bank of Houston
 Richardson Vicks/Home Care Products Div.
 Richardson Vicks/Health Care Products Div.
 Riggs National Bank
 Roadway Express, Inc.
 Robert Landau Associates
 Rochester Telephone Corp.
 Rosen, Inc. (NYSE)
 Ryder System, Inc.
 Salomon Brothers
 Schering Plough
 Shearson/American Express, Inc.
 Scott Paper Co.
 Seaboard System Railroad
 Shawmut Bank of Boston, N.A.
 Secor Corporation

Slawson Oil Company
 Smith Barney Harris Upham and Co., Inc.
 SmithKline Beckman
 SmithKline French Labs
 Soabar Graphics
 Southwest Bancshares
 Southern Company Services
 Southern National Bank
 Southern New England Telephone Co.
 State of North Carolina
 State Street Bank of Boston
 Sun Banks of Florida
 Telesat Communications
 Tenneco Oil Co.
 Texas Instruments
 The Aviation Group
 The Cooper Group
 The Village Companies, WBAG
 The World Wildlife Fund
 Thomas J. Lipton, Inc.
 Thomson McKinnon Securities, Inc.
 Time Marketing, Inc.
 Touche Ross & Co.
 Trammell Crow Company
 USA Today
 U.S. Steel Corp.
 U.S. Treasury Dept.
 Union Camp Corporation
 United States Air Force
 Vantage Company
 Virginia Electric & Power Co.
 Wachovia Bank & Trust Co., N.A.
 Webster Spring Co.
 Western Electric Co.
 Western Union Telegraph
 Westinghouse Electric Corporation
 Wilson Sporting Goods Co.
 Woodrow Wilson Foundation
 World Bank
 WTIK
 Xerox Corporation
 3M Corporation

Student Life



Living Accommodations

Duke University has several residential facilities in which graduate and professional students reside: Town House Apartments, modular homes for single students, and Central Campus Apartments for single and married students.

Town House Apartments. Town House Apartments, located in the Central Campus area, is a thirty-two-unit complex, which houses graduate and professional school students. These apartments are more spacious than the apartments found on campus or in Durham. Because of their location away from the academic facilities of the two campuses, students find that these apartments offer a change from normal campus life and activities. They are available for continuous occupancy throughout the calendar year. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months.

Each air-conditioned apartment includes a living room, master bedroom, one and one-half baths, a single bedroom, and an all-electric kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment.

Occupants must make arrangements with the local utility companies to pay for electricity, gas, and telephone service. These companies usually require a deposit when initial applications for service are made. Utility companies should be contacted prior to arrival as it usually takes two to three days to obtain service.

Central Campus Apartments. During 1975, Duke University completed a 500-unit apartment complex. The apartments are two- and three-bedroom units, which are available throughout the calendar year for continuous occupancy to single and married graduate and professional students.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephones, which are provided in preinstalled locations in each apartment, are serviced through Duke University's Tel-Com telephone service. Central Campus Apartments' residents are responsible for having their phones connected.

Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic term to the University. This method permits students to share apartments with others of their choice. When this arrangement is impractical, the Department of Housing Management strives to place persons with similar interests together. Single student apartments are completely furnished. An itemization of furnishings is included with the floor plans sent out in the application packet.

Central Campus Apartments are provided on a lease basis to married students, and monthly rental payments should be made as required by the terms of the lease.

Married students may request either unfurnished or partially furnished apartments. Draperies and kitchen appliances are furnished in all apartments.

Modular Homes. Duke University owns six prefabricated modular homes which are located one block from the main East-West Campus bus line. These three-bedroom homes are completely furnished for three-person occupancy and provide more privacy than most apartments.

The homes are available to single graduate and professional students for continuous occupancy throughout the calendar year.

In addition to having three bedrooms, each home contains a full bath, an all-electric kitchen, a dining area, and a living room. Sliding glass doors in the living room open onto a wooden deck. An outside storage area is provided in addition to spacious closets within the home. Except for the bathroom, kitchen, and dining area, the homes are completely carpeted and paneled.

Residents of the modular homes are responsible for making arrangements with local utility companies for gas, electricity, and telephone services.

Off-Campus Housing Information. In addition to University housing, the apartment operations office maintains an off-campus listing service throughout the year. This service provides a list of privately owned homes, apartments, duplexes, and efficiencies for rent in Durham. A listing for people seeking roommates with housing or roommates needing housing is also provided. During the summer, an assistant is available to answer questions about off-campus housing.

Due to a shortage of available housing in the Durham area, the search for accommodations should begin as soon as possible after acceptance at Duke. A two- or three-day visit would provide the opportunity to use the off-campus listing service and to inspect the facilities available. Except for assuring that owners sign a statement of nondiscrimination, neither the University nor its agents negotiate between the owners and interested parties.

Application Procedure. The Department of Housing Management provides students accepted to the University with housing application forms and detailed information on rates, rental agreements, and availability of housing. A completed and returned application form, accompanied by the required residential deposit, is necessary to be considered for assignment. Applications will be processed on a first-apply, first-assigned basis.

Food Services

Duke University Food Services (DUFS) offers a board contract program. The plan is called the DU Key. Basically, the DU Key is a prepaid credit card plan. The program provides a number of food plans and options which can be tailored to individual student needs. A nominal \$10 fee is required to purchase a key card. DU Key contracts are purchased for the full academic year, but purchase dollars may be split by semester to assist students in budgeting for the entire year. DUFS provides a forecasting chart to aid students in determining weekly needs which can be applied to a yearly budget.

The DU Key program offers unlimited seconds cafeterias, a-la-carte cafeterias, snack bars, salad bars, restaurants, pizza delivery, and service for catered events.

Students interested in the DU Key should call the DUFS meal plan office at (919) 684-5800 for complete information.

In addition to the above University food services, the Fuqua School of Business has its own cash snack bar, *The Kiosk*, which serves a limited menu of light snacks, sandwiches, and beverages during normal operating hours.

Student Activities

M.B.A. Student Association. The association serves as liaison between the students and faculty and administration in both academic and nonacademic matters. The

structure of the association includes several standing and ad hoc committees dealing with concerns such as admissions and placement, computer and library facilities, intramural sports participation, alumni, and social events.

Cocurricular Activities. Graduate students at Duke University are welcome to use such University recreational facilities as swimming pools, tennis courts, and golf course, and to affiliate with the choral, dance, drama, music, and religious groups. They may become junior members of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities.

A full program of cultural, recreational, and religious activities is presented by the Office of Cultural Affairs, the Duke University Parish Ministry, the Duke University Union, the Office of Student Activities, and recreational clubs. The Duke University Union sponsors a wide range of programs through its committees which are open to all segments of the campus community. Included are touring Broadway shows; rock, jazz, and pop concerts; speakers; films; a film-making program; the largest fully student-run television station in the country; art exhibits in two galleries; and a broad program in crafts located in Southgate Dormitory and the Bryan University Center.

The University Center complex includes the new Bryan University Center, which houses the Information Center, two drama theaters, a film theater, lounges, stores, meeting rooms, games room, rathskeller, art gallery, and other facilities; the West Union which includes dining facilities; and Flowers Building, which includes student publications, Page Auditorium, and the University box office.

Inquiries should be directed to the Intramural Office, 105A Card Gymnasium; the Office of Cultural Affairs, 107 Page Building; Duke Chapel; the Duke University Union, Bryan University Center; or the Office of Student Activities, Bryan University Center.

Full information regarding the scheduling of major events and programs for the entire year will be found in the Duke University *Annual Calendar*; detailed and updated information for the fall and spring semesters in the *Weekly Calendar*, available each Friday; updated information for the summer session in the *Summer Session Calendar*, published at the beginning of each summer term; and the *Duke Chronicle*, published each Monday through Friday during the fall and spring and each Wednesday during the summer. Copies of the Duke University calendars may be obtained at the information desk, Flowers Building, or the calendar office, Page Building. Also during the summer, the *Summer Session Newsletter* is published weekly by the summer session office and is available at convenient locations.

Intramural and Recreational Sports. The Duke recreational and intramural programs provide all students with opportunities to participate in some form of healthful, informal, and competitive physical activity. In a typical year, more than 3,000 students compete for many intramural titles and trophies. Each year Duke, the University of North Carolina, North Carolina State, and Wake Forest meet in the annual Big Four Intramural Day.

The men's and women's intramural programs include many different activities (e.g., bowling, cross-country, golf, handball, horseshoes, tennis, flag football, badminton, racquetball, basketball, swimming, table tennis, volleyball, soccer, softball, and track). In addition, special events in other areas of interest are held. Various performing clubs, including one for water ballet, offer the student opportunities to take part in extracurricular activities. Through coeducational intramurals, the student is encouraged to participate on a less competitive level, promoting relaxed social and physical activity. Opportunities for competition between men and women are provided in areas that include archery, badminton, basketball, softball, racquetball, squash, table tennis, tennis, volleyball, and water polo.

The University's varied athletic and recreational facilities and equipment are available for use by students. The facilities for recreation include a golf course, lighted

tennis courts, three swimming pools, squash and racquetball courts, three gymnasiums, a weight training room, outdoor handball and basketball courts, an archery range, horseshoe courts, an all-weather track, numerous playing fields, jogging and exercise tracks, and informal recreational areas. More than thirty sports clubs dealing with gymnastics, scuba diving, sailing, cycling, crew, riding, fencing, football, frisbee, ice hockey, kayaking, lacrosse, badminton, karate, rugby, soccer, and other activities are available to interested students.

Graduate and Professional Student Council. The Graduate and Professional Student Council is the representative body for the students of graduate departments and professional schools. The council provides a means of communication between schools and between graduate students and the administration. The council selects graduate students for membership on University committees. Representatives of each department and officers of the council are selected annually.

Religious Life. The Duke Chapel is open daily for prayer and meditation. The Sunday morning worship in the Chapel at 10:55 A.M. is the central focus for University religious life. The Chapel Choir is open to those who wish to sing in it. The Benjamin N. Duke Memorial Organ is played Monday through Friday from 12:30 P.M. to 1:30 P.M. Special guest recitals are also scheduled. The ministers and other members of the Chapel and Religious Life staffs are available to provide counseling help and other assistance as needs arise.

Services Available

Medical Care. The aim of the Student Health Service is to provide any medical care and health advice necessary to the student as a member of the University community. The health service maintains the Student Health Services Clinic located in the Pickens Building on West Campus and the University Infirmary on the East Campus. Emergency transportation can be obtained by the Duke campus police. A separate fee for the Student Health Service is assessed.

The Student Health Service offers varied benefits. To secure them, full-time graduate students must be in residence; during the fall and spring semesters, they must be registered for at least 9 units per semester until they have passed the doctoral preliminary examination, after which they must be registered for at least 3 units in residence. During the summer, graduate students must be registered for at least 1 unit of research or 3 units of course work. The student health fee is nonrefundable after the first day of classes in the semester.

The Student Health Services Clinic offers the student outpatient services, routine laboratory and X-ray examinations in the clinic for the treatment of acute illness or injury, and advice and assistance in arranging consultation for medical treatments. Fees for such consultations or treatments must be paid by a student who is not covered by an insurance plan.

The facilities of the University Infirmary are available to all currently enrolled full-time students in residence during the fall and spring. Hospitalization in the University Infirmary is provided for treatment of acute illness or injury as authorized by the Student Health Services Clinic physician. Students are required to pay for their meals while confined to the infirmary.

The resources of the Duke University Medical Center are available to all Duke students and their spouses and children. Any bills incurred at Duke Hospital or any other hospital are the responsibility of the student, if not covered by an insurance plan. The Student Health Program does not provide health care for spouses and dependent children of married students. Coverage of the married student's family is provided in the University's Student Accident and Sickness Insurance Plan for an

additional fee. Refer to the chapter, "Financial Information," for complete information on this plan.

Counseling and Psychological Services. CAPS provides a comprehensive range of counseling and psychological services to assist and promote the personal growth and development of Duke students. The professional staff is composed of clinical social workers, psychologists, and psychiatrists experienced in working with young adults. Among services provided are personal, social, academic, and career counseling. A number of short-term seminars or groups focusing on skills development and special interests such as coping with stress and tension, fostering assertiveness, enriching couples' communication, and dealing with separation and divorce are also offered. A policy of strict confidentiality is maintained concerning information about each student's contact with the CAPS staff. Individual evaluation and brief counseling/therapy as well as career and skills development seminars are covered by student health fees. There are no additional charges to the students for these services. Appointments may be made by calling 684-5100 or visiting CAPS, 214 Old Chemistry Building.

Academic Procedures and Information



Registration

All students enrolled in the Fuqua School of Business must register each semester until all degree requirements are completed. After receiving notification of admission to the school and returning a statement of acceptance of admission, the student must register for the term indicated in the admission letter. New matriculants register during orientation week at the designated times. Each student must complete a course card listing the course work to be taken during the semester and obtain the approval of the appropriate program director. The student then presents this course card to registration officials for enrollment in the selected courses. After the first registration, a student must register for subsequent semesters at the regular stated time for registration. Currently enrolled students who fail to register at the first scheduled registration period for the subsequent semester incur a penalty for late registration.

Late Registration. All students are expected to register at the times specified by the University. A late registration fee of \$25 is charged any student registering late.

Change of Registration. During the first *two weeks* of the semester, registration may be changed with the approval of the program director.

Academic Requirements for the M.B.A. Program

Grading. The grading scale for M.B.A. students is: Superior (SP)—4.0; High Pass (HP)—3.5; Pass (P)—3.0; Low Pass (LP)—2.5; and Fail (F).

Continuation Requirements. An M.B.A. student is expected to complete all courses approved by his/her Program Director for a given semester and attain a GPA of 3.0 to proceed to the next semester of the program.

Any student who receives a grade of fail (F), or a grade point average of less than 3.0 after any term, will be subject to academic performance review. The student's academic standing is determined during his/her performance review by the respective Program Director and the faculty of the Curriculum Committee. Any mitigating circumstances that may have inhibited a student from making satisfactory progress will be heard and evaluated at that time.

In order to be certified as making satisfactory progress toward the degree, a student enrolled in the M.B.A. program must:

1. Complete all courses approved by his/her Program Director for a given semester and attain a GPA of 3.0 or: have been reviewed by the Program Director and faculty of the Curriculum Committee, and been determined that mitigat-

ing circumstances did inhibit the student from meeting all course requirements or attaining a 3.0 GPA. Under these circumstances the student will be allowed to continue the program with a GPA below 3.0 and still be considered as making satisfactory progress toward the degree.

2. Complete the program according to the following schedule: a minimum of 24 credits in the first calendar year of the program, 48 credits in the second calendar year of the program, and 63 credits by the third calendar year of the program.

For students enrolled in the Executive M.B.A. Evening Program, they must complete a minimum of 20 units by the end of the first calendar year, 40 units by the end of the second calendar year, and 50 units by the end of the third calendar year.

For students enrolled in the Executive M.B.A. Weekend Program, they must complete a minimum of 21 units by the end of the first calendar year, 36 units by the end of the second calendar year, and 48 units by the end of the third calendar year.

Students on official leaves of absence from any program will be exempted from these requirements for the duration of that leave.

Graduation Requirements. An M.B.A. student who has successfully completed all program requirements and has earned a grade point average of at least 3.0 will be graduated.

Exemptions. Students seeking an exemption from any course, curricular requirement, or other requirement of the Fuqua School of Business must submit a formal request to the Director of the M.B.A. Program. Exemption from a required course may be secured by passing an exemption examination in the subject matter of that course.

Standards of Conduct. Duke University expects and will require of all its students' cooperation in developing and maintaining high standards of scholarship and conduct. The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University currently in effect or which are put into effect from time to time by the appropriate authorities of the University.

Any student in accepting admission indicates a willingness to subscribe to, and be governed by, these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

The Fuqua School of Business has established its own Honor Code which is overseen by a Judicial Board comprised of three faculty and three student members. The Honor Code governs conduct and the integrity of student scholarship.

Commencement

Graduation exercises are held once a year in May. At this time degrees are conferred and diplomas are issued to those who have completed requirements by the end of the spring semester.

Those who complete degree requirements at the end of the fall semester or by the end of a summer term receive diplomas dated December 30 or September 1, respectively. There is a delay of about one month in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Other Information

Student Records. Duke University adheres to a policy permitting students access to their student records, with the exception of confidential letters of recommendation

received prior to January 1, 1975, and certain confidential financial information. Students may request review of any information which is contained in their student records and may challenge the content of their records by appropriate procedures. An explanation of the complete policy on student records may be obtained from the Associate Registrar.

No information contained in student records (academic or otherwise) is released to persons outside the University or to unauthorized persons on the campus, without the consent of the student. A student grants consent by signing a form which authorizes the release of data. Specific consent is required for the release of information to any person or organization outside the University, and it is the responsibility of the student to provide the necessary authorization and consent.

Reciprocal Agreements with Neighboring Universities. Under a plan of cooperation between Duke University and the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro, North Carolina Central University in Durham, and North Carolina State University at Raleigh, students properly enrolled in the Fuqua School of Business during the regular academic year, and paying full fees to this institution, may be admitted to a maximum of two courses per semester at one of the other institutions in the cooperative plan. Under the same arrangements, students in the graduate schools in the neighboring institutions may be admitted to course work at Duke University. All interinstitutional registrations involving extra-fee courses or special fees required of all students will be made at the expense of the student and will not be considered a part of the Duke University tuition coverage.

Identification Cards. Graduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee. The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of a card immediately to the Registrar's office. The cost of a new identification card is \$5.

Courses of Instruction



Master of Business Administration

CORE COURSES—300 SERIES

These courses are required to be taken in the first year except for Business Policy and the Management Experience (BA 340) and one course in the environmental field (one of BA 302, BA 342, or BA 345), which are typically taken in the second year. Students passing exemption exams may substitute electives in their first year. Unless specified otherwise, each course is worth three units of credit.

300. Managerial Economics. Considers how the actions of business firms, consumers, and the government—operating within a price system in a decentralized market economy—answer such basic resource allocation questions as what will be produced, how it will be produced, who will consume what is produced, and what resources to divert from present consumption to increase future consumption. The impact of various types of market structures (such as perfect competition, monopoly, and oligopoly) on economic efficiency will be discussed. Provides the student with an ability to view resource allocation problems within a constrained optimization framework and with some practice in applying marginal analysis.

301. Economic Environment of the Firm. Develops the theoretical framework within which the determinants of economic aggregates such as gross national product, the rate of unemployment, and changes in price levels can be analyzed. The emphasis of the course is to provide the manager with the knowledge necessary for making and understanding forecasts of the macroeconomic environment. Both Keynesian and monetarist approaches are considered.

302. The Economics of Government Policy toward Business. Provides the student with an understanding of how the firm interacts with other institutions in the economic environment. By examining both the theoretical and institutional framework of regulation, antitrust activities, and labor unions, the prospective manager will be better prepared to interact with noncorporate organizations. In addition, the course seeks to examine the role of the firm in the economy and the way in which it carries out its activities. Prerequisite: second-year standing in the M.B.A. program or consent of instructor.

311. Statistical Analysis for Management. Examines structures for managerial decision making under conditions of partial information and uncertainty. After developing a foundation in probability theory, the course extends this foundation to a

set of structures and methodologies for the analysis of decision problems. Included are topics in probability, classical inference, and multivariate analysis.

312. Quantitative Analysis for Management. Examines the principles and techniques of building quantitative models to aid managerial decision making. Special emphasis is placed on utilizing models for structuring and analyzing resource allocation problems and decision problems under uncertainty. Topics include linear programming, decision analysis, and simulation.

318. Computer Laboratory. Introduces the student to the personal computer as an aid to executive decision making. The course covers the operation of the personal computer, and the use of software including electronic spread sheets, statistical analysis, and word processing. 1 unit.

320. Organization Behavior. Provides a study of organizations and their environment and the social and psychological foundations necessary to understand the behavior of individuals within organized settings. Emphasis is given to managerial strategies which enhance organizational effectiveness. Topics include individual and small group behavior, goal setting and adaptation, organization structure, and leadership.

330. Financial Accounting. Introduces the student to the types of information requirements imposed on the firm by agencies in its environment and develops an understanding of the activities of the firm within the framework of a financial accounting system designed to satisfy these information requirements. Emphasis is given to the study of financial accounting, reporting, and measurement problems from a theoretical and an applied basis, using cases and topical problems in financial accounting as a foundation for the learning experience.

331. Managerial Accounting. Focuses primarily on managers who are users rather than preparers of accounting information. Examines the use of accounting information in its major functions of planning, control, and product costing. Specific topics include cost estimation, budgeting, standard costing, control and performance evaluation, cost allocation, information systems, data limitations, and rational decision making using accounting information.

340. Business Policy and the Management Experience. Enables the student to apply the skills obtained in earlier courses to managing a business enterprise. The first portion of the course deals with issues like competitive analysis. In the course's second portion, student teams are responsible for the management of firms in a computerized simulation which has the characteristics of a large, consumer-oriented industry. Emphasis is placed on developing an overall corporate strategic plan, implementing the strategy, and communicating the plan and results to boards of directors. Decisions must be made concerning the fundamental areas of operations, marketing, finance, and human resource management. These decisions are made in light of the strategic objectives set forth in the plan. Each firm makes several formal oral and written presentations to its board of directors which is composed of faculty and executives from the local business community. The use of personal computers for analysis and report preparation is encouraged.

342. Social, Legal, and Political Environment of the Firm. Examines the social, political, and legal environment within which the business firm exists and must function. Particular attention is focused on those issues which have the potential for significant alteration of the historical rules by which society has exercised control over corporations and small businesses. Issues of corporate legitimacy and accountability in a democratic society, business ethics, the roles and responsibilities of senior management and boards of directors, and the participation of the corporation in the for-

mation and implementation of public policy are to be examined in this course. Underlying each issue to be examined in this course is the question "How does the corporation adapt itself to the changing expectations of the public?"

The course is organized around films, case discussions, role playing simulations, guest speakers, and lecture discussions. The course is intended to be topical and intellectually stimulating. Recent topics involved business ethics, business and the media, criminal liability of executives, role of boards of directors, future of capitalism in the United States, political action committees, business lobbying, and the new federalism. Prerequisite: second-year standing or permission of the instructor.

345. Legal Environment of the Firm. Considers the legal environment of the firm with emphasis on the legal system, the process by which laws are formulated and changed, and the type and forms of legal constraints imposed on firms. Also examined are major legislation, court cases, and regulation by federal agencies which affect the firm's decisions. Prerequisite: second-year standing in the M.B.A. program or consent of the instructor.

350. Financial Management. Focuses on the acquisition of financial resources from the external market and their effective utilization and control within the organization. Specific attention is given to capital markets, evaluation of the firm, short-run resource planning (cash, inventory, receivables, and short and intermediate-term financing), and long-run resource planning (investment in long-lived assets, leasing, debt and equity financing, dividend policy, and the cost of capital). Institutional aspects of financial markets are emphasized only to the extent that they provide necessary insights into the problems of planning financial strategy.

360. Marketing Management. Provides an overview of the marketing function in business firms by acquainting students with the fundamental issues and decisions involved in planning and managing marketing activities. Attention is given to the strategic marketing decisions of new product development, product policy, pricing, advertising and communications, marketing research, personal selling, and channels of distribution. Major emphasis is placed on developing an understanding of the underlying forces which influence marketing decisions, including buyer behavior, competitive marketing activity, organizational considerations, and governmental regulation.

370. Operations Management. Surveys issues in the design, operation, and control of the process by which goods are manufactured and services delivered. Specific topics of study include the analysis of different kinds of production processes, managing the workforce, planning production and managing materials, managing quality, choosing new capacity, dealing with technological advance, dealing with vertical integration, and combining operations choices into a coherent strategy.

388. Business Communications. Constitutes a program in oral and written communication. It helps students develop the abilities to organize clearly and present effectively both written and oral reports. 2 units.

ELECTIVE COURSES—400 SERIES

These courses are typically taken by students with second-year standing but may be taken earlier with permission of the instructor. These courses are generally offered each year, but there may be additions or deletions in response to student and faculty interest. Unless specified otherwise, each course is worth three units of credit.

410. Operations Research Applications. Deals with problems of organization for an operations research project, formulation of the problem, model construction, interpretation of analytical results, and implementation. Selected cases of particular applications of operations research from the literature serve as a basis for much of the

class work. Students work in local industry, the University, the Medical Center, or in other cooperating agencies on operations research problems. Methodologically, some attention is devoted to advanced solution techniques as necessary to complete student projects, but primary attention is focused on formulation and use of models, the modification of existing models, or the development of new ones.

411. Operations Research Methods. Surveys the methodologies of operations research and shows how they can be applied to decision-making situations. The course will be primarily concerned with selecting which tool to use in various situations, rather than algorithm details. Topics to be covered include dynamic programming, stochastic programming, integer programming, nonlinear programming, Markov chains, inventory theory, and linear model formulation.

412. Corporate Models and Forecasting. Examines corporate models as a key planning tool used by managers within a firm in planning the future of the company. This course discusses the theory and practice involved in developing a model of a firm or a business within the firm. Model formulation, estimation, and simulation are covered. The related topic of forecasting, an integral aspect of such models, is also examined.

420. Organization and Information System Design. Examines the way to design organization structures and information systems. Modern firms are organized around their effectiveness in the creation and use of information. They use decision rules and information to coordinate decisions, control processes, and reward individuals. Examples are drawn from accounting, finance, marketing, and human resource management as well as policy issues. These area applications are implemented in firms with varying degrees of effectiveness and efficiency depending upon the organization structure, information system, and incentives. These relations are investigated in detail in the class through lecture/discussion and case studies and/or field studies. The field studies would emphasize organizational description and change to achieve increased performance.

422. Dynamics of Bargaining. Explores the processes of bargaining and negotiation; the dynamics of interpersonal and intergroup conflict; and understanding of theory and research related to processes of influence, negotiation, and conflict management. A second part will emphasize skill development through extensive case analysis, role playing, and simulation.

423. Human Resource Management. Provides an integrative and comprehensive understanding of issues and challenges involved in the management of human resources in contemporary, complex organizations. The topics discussed include employee selection and placement, training and development, compensation and reward systems, performance evaluation, career development, and human resource planning. The legal context of human resource practices is also addressed. Perspectives for this course are from the line or operating managers primarily. The role of the personnel department and the personnel specialists is evaluated in terms of their contribution to the human resource function within the operations of the line manager.

424. Managerial Effectiveness. Explores what is known about effective management and leadership in organizations, and helps prospective managers identify and improve their own leadership skills. To achieve these purposes the course will alternate between a review of past research on organizational leadership and practical skill development. Readings and class discussion will provide exposure to various models of effective managerial behavior. In addition, much of the class time will be structured so that students will have an opportunity to experiment with, observe, and practice the skills being considered. Some of the topics reviewed include leadership style,

organizational politics, interviewing, setting objectives and appraising performance, planning and time management, improving group effectiveness, and conflict management. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

425. Managerial Decision Making. Focuses on helping managers to understand and improve decision making. The primary objective is the development of skills in the use of decision aids that exploit the intellectual strengths of humans while overcoming their cognitive limitations. Of particular interest will be the techniques of decision analysis and the computer-based technology of decision support systems. Case discussions, experiential exercises, as well as lectures, will be used to help develop an appreciation of the potentials of various decision aids. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

426. Organizing Business Activities. Organizing individuals' activities and decisions to perform tasks, solve problems, and achieve goals in business. Choices on the patterns and relations in people's activities and decisions that coordinate and control people to produce desired ends are studied. Different kinds of organizing decision problems and their relations to one another are identified and analyzed. The efficiency and effectiveness of the part or the whole of the organization that results from these decisions are analyzed for different environments. Organizing problems of divisionalized, matrix, functional, and other organizations are investigated. Organizing problems of departments, project teams, sections, and smaller units are also studied. The object is to understand the nature of the problems of organizing so that the solutions that emerge match the part or the whole of the organization to its goals, and to make both these fit the internal and external environments. The work includes readings, cases, and examinations of actual contemporary organizing problems and decisions. This course is intended for the student who is interested in getting it together, making it happen, writing the playbook, and staying with it. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

427. Industrial Relations. Introduces students to the concept of an industrial relations system and the constraints that the choice of such a system places on a manager. The course begins with an in-depth analysis of the traditional North American unionized system, moves through the means by which this system is presently evolving, and concludes with a survey of some alternative systems. This course uses a union model as a means of introducing issues relevant to all industrial relations systems.

428. Managing Change and Innovation. Managing innovation, new technology, new product development, and research in the changing enterprise. Topics include the management of project selection, project implementation, manpower and resource allocation among competing activities, budgeting, productivity measurement and enhancement, conflict and coordination among organizational subunits, adaptive organizational forms, devising incentives and reward schemes for engendering new ideas, and risk taking. The course will use a combination of readings, lecture/discussions, cases, and guest lectures by managers. Students are encouraged to do field studies. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

430. Financial Accounting Standards and Analysis I. Examines problems of asset and liability valuation and the related issues of income determination from the perspective of the professional accountant. The information needs of financial statement users are emphasized. Frequent reference is made to professional accounting pronouncements. Prerequisite: M.B.A. standing, one course in financial accounting, and one course in managerial accounting.

431. Financial Accounting Standards and Analysis II. Considers issues regarding ownership equities and the related problems of income determination from the perspective of the professional accountant. Specific attention is devoted to the accounting and reporting problems of complex corporate enterprises. The course emphasizes the information needs of financial statement users. Frequent reference is made to professional accounting pronouncements. Prerequisite: BA 430.

433. Management Planning and Control. Examines recent developments in the use of managerial accounting information with regard to the areas of management planning and control. Advanced topics will be approached from an applications orientation.

434. Corporate Financial Reporting. Focuses on significant issues of interest to users of publicly available accounting information, including financial statements. Issues of current interest in the valuation of assets and liabilities and income determination are considered. Emphasis is placed on the effects of alternative accounting measurement and reporting procedures on users' decision models.

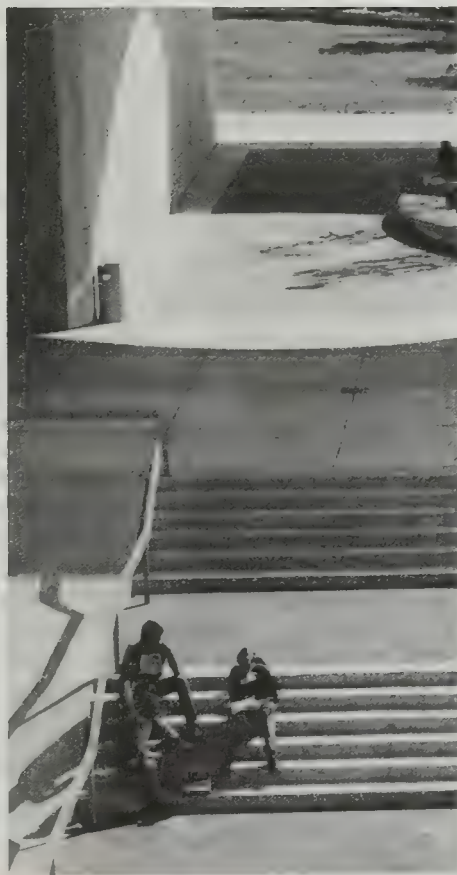
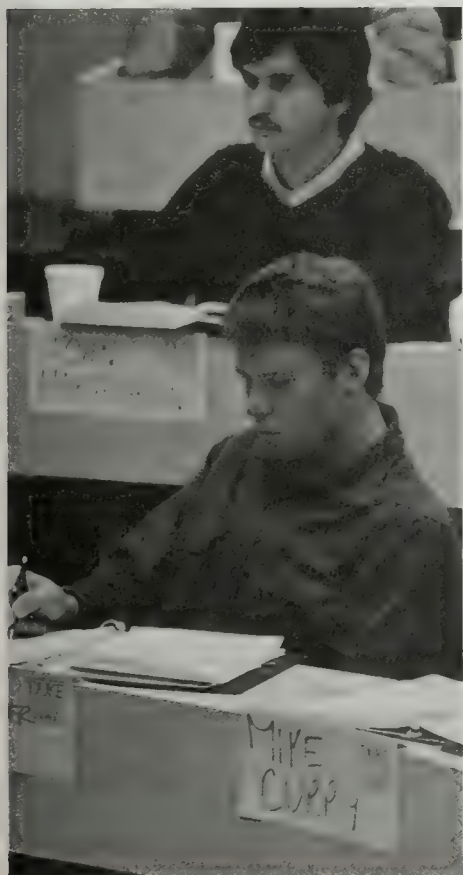
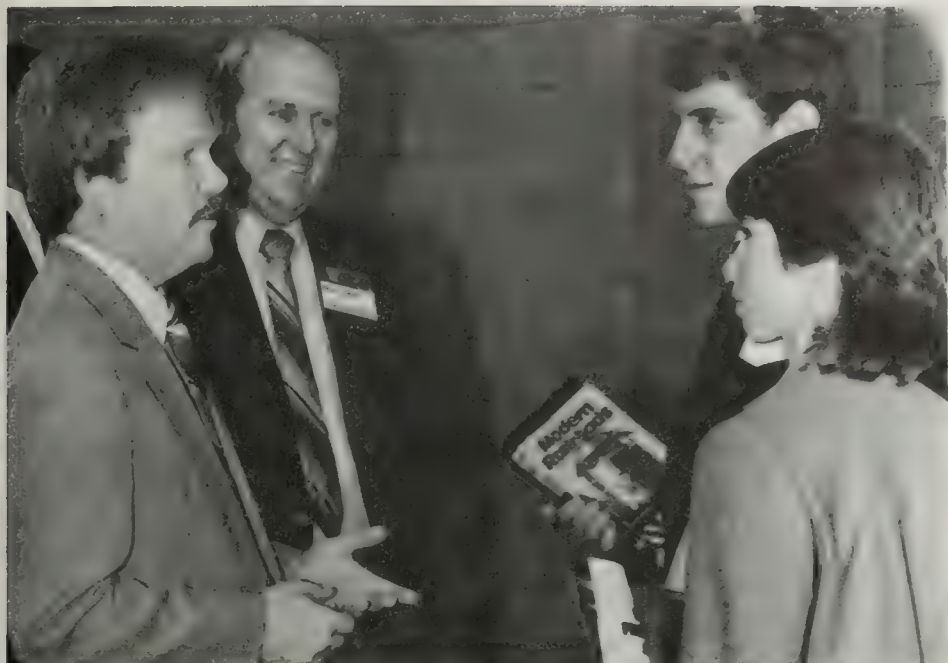
435. Management Information and Control Systems. Focuses on the set of problems associated with the design and operation of the information systems necessary to support strategic planning of an organization and to support the organization's control system. Specific attention is given to the role of information in planning and control, the economics of information, the dynamics of information flows, technologies of information systems, information system design, data base construction and maintenance, and reporting systems.

436. Internal Control, Auditing, and Information Systems Analysis. Studies the techniques available to evaluate the reliability of an existing information system. An evaluation is made of information flows, aggregation techniques and other topics necessary to evaluate the credibility of information reported from a particular data gathering system. Topics include audit objectives from an internal and external standpoint, cost of information, standards, and other topics relevant to both internal and external auditing problems.

437. Financial Statement Analysis. Explores the use of financial statement information within the context of modern finance and accounting research. Empirical studies are introduced to demonstrate how financial statement data interface with nonaccounting data such as stock prices, industry factors, and macroeconomic variables. Major topics include the statistical properties of accounting numbers in time-series and cross-sectional analyses, the role of financial statement information in efficient capital markets and in portfolio decisions, and the association between accounting numbers and security returns. The course also examines financial information used in credit granting decisions and in predicting bond ratings and bankruptcy.

440. Corporate Strategy and Public Policy. Examines the major phases of the strategic planning process in business firms and with the manner in which business firms can affect public policy. Considerations involving the various functional areas of management are synthesized to permit executives to make meaningful decisions concerning the product-market posture of the firm. Examples of the topics covered include formulation of goals, analysis of the external environment, bottom-up and top-down planning, coordination and control, management objectives and responsibilities, and the role of business firms in influencing public policy.

442. Entrepreneurship and New Venture Management. Focuses on the formulation and strategies for implementation of a new business venture. It is a course designed to expose students to an alternative career as independent business men and women. Entrepreneurs who have succeeded and failed will assist the students in developing and evaluating their new venture ideas.



445. Business Planning. Presents corporate, security, and tax issues for analysis and resolution through examining a series of problems involving common business transactions. The problems will include such topics as the formation of closely-held and public corporations, stock redemption, the sale of a business, merger and other types of combination transactions, and recapitalization, division, and dissolution of corporations.

446. Federal Income Taxation. Deals with the basic concepts of federal income taxation with emphasis on gross income inclusions and exclusions, deductions, credits, and computations of gain, loss, and basis upon dispositions of property.

450. Short-Run Financial Management. Examines the financial management and control of a firm's short-term assets and liabilities. Topics include cash management, collection and disbursement techniques, management of the firm's short-term investment/borrowing portfolio, cash forecasting, receivables management, and the management of the firm's bank relationships. Credit is not given for both BA 450 and BA 456. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

451. Long-Term Financial Management. Deals with the long-term financing and investment decisions of the firm. Special attention will be given to the valuation of corporate securities, capital structure theory and policy, capital budgeting, corporate planning models, and analysis of the firm's cost of capital. Credit is not given for both BA 451 and BA 456. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

452. Money and Capital Markets. Considers the structure and behavior of capital markets. The course includes a discussion of the institutional framework of the American capital market as well as the major international markets, although the emphasis is on the theoretical foundation for analyzing interest rates and funds flow in those financial markets. Included among the topics is an extended discussion of monetary theory, the term structure of interest rates, and the analysis of risk in financial markets.

453. Investment Analysis and Portfolio Management. Focuses on the problems of selecting individual security issues for investment and the construction, management, and performance evaluation of portfolios. Topics that are covered include the structure and operations of securities markets, the behavior of security prices, the analysis and valuation of various types of securities, and the implementation of portfolio and capital market frameworks and tools for analysis.

454. Management of Financial Institutions. Explores various ways in which management science techniques can be applied to the management problems of financial institutions, especially commercial banks. The course will examine several types of financial institutions, consider the role that they play in the American economy, and focus on the use of management science techniques for helping executives cope with planning, decision making, and control problems.

455. Futures and Options Markets. Focuses on the use of futures and option contracts in the financial management of corporations and the management of security portfolios. In the futures area emphasis is placed on interest rate futures, currency futures, and stock index futures. General pricing of agricultural futures is also studied as well as the use of agricultural and other contracts in diversifying security portfolios. In the options area, emphasis is placed on the use of stock options in the financial management of stock portfolios. Also, interest rate options and the use of option pricing models in the formulation of optimal option investment strategies are studied.

456. Corporate Finance. Provides a selective overview of both short-run and long-term issues in financial management. This course is designed for students not

considering finance as their area of principal interest. Topics include cash management, collection and disbursement techniques, cash forecasting, short-run financial planning, receivables management, capital budgeting under uncertainty, capital asset pricing theory and the cost of capital, dividend policy, and the capital structure decisions. Credit is not given for BA 456 and either or both BA 450 or BA 451. Prerequisite: second-year standing in the M.B.A. program or consent of instructor. 3 units.

457. Entrepreneurial Finance: The Investment Decisions. Certain investment decisions undertaken by a business organization, big or small, may be regarded as being truly entrepreneurial in the sense that the decisions have significant strategic implications, and that relevant information may be fragmentary, incomplete, or very uncertain. To illustrate such risky investment decisions, one might consider a proposal to change production technology, a proposal to enter a new market environment, or a proposal to locate facilities abroad. Such decisions tend to require significant resource commitments where the management of risk is critical to the success of a venture. Approximately the first half of this course will be conceptual in nature with the objective of designing an analytical framework for use in decision making. The second half of the course will be applications oriented with a series of case studies being used to explore this area of management activity.

460. Advanced Marketing Strategy. Considers in greater depth the process of strategic planning in the marketing function and its relation to corporate strategy. Offers an opportunity to sharpen and extend analytical skills in marketing as well as to synthesize understanding of the managerial, organizational, and environmental aspects of marketing activity.

461. Marketing Research. Considers the process of identifying and generating information from research as input to marketing decision making. Emphasis given to the perspective of the marketing manager in determining whether additional information is needed and, if so, how appropriate information should be acquired. Topics include problem definition, research budgeting, research designs (survey, observational, experimental), sampling, methods of data collection, data analysis, and interpretation.

462. Consumer and Buyer Behavior. Provides an opportunity for advanced study of the behavior of buyers of consumer and industrial goods/services. Objectives include (1) increasing the prospective manager's sensitivity to and understanding of buyers and the psychological, sociological, and anthropological forces which shape their behavior, and (2) enabling the student to apply this knowledge in arriving at improved marketing decisions.

463. Advertising Management. Deals with issues and problems in planning and controlling advertising activities in the firm, largely from the perspective of product managers and general marketing managers who must develop strategies for communicating with customers and other important publics of the firm. Attention is devoted to the setting of advertising objectives, budget appropriation, copy/message strategy, media strategy, advertising research and evaluation, and government regulation. Emphasis is placed upon behavioral analysis of target audience utilizing social-psychological and communication theories.

464. Product Management. Develops further insights into the process and policies which guide the firm's offering of products to the market place. Topics include the problem of merging market needs with corporate resources; product concept and positioning; systematic approaches to new product development; branding; packaging; product abandonment. The basic point of view is strategic in that product

decisions are an integral part of overall marketing strategy decisions. Interfunctional management aspects are also considered.

465. Industrial Marketing. Provides students with the conceptual foundations and analytic techniques used in marketing products and services to businesses. Marketing issues are approached through complementary industry and firm analyses. An industry analysis characterizes the economic forces driving relationships among competitors, suppliers, and customers. Within the context of the industry, the appropriate strategy for the firm is determined. In addition to cases and readings, students are expected to complete one industry analysis using largely library sources. Following the industry analysis they are expected to write a strategic analysis of one firm within that industry.

470. Operations Planning and Control. Examines detailed tactical problems facing operating managers. The emphasis is on specific planning and control problems and on techniques for solving them. Topics include materials planning and inventory control, aggregate and detailed scheduling, and manufacturing software packages.

471. Manufacturing Strategy. Investigates the strategic operating policy options available to manufacturing companies, with the goal of learning why some companies' manufacturing operations are a greater competitive threat than others. The concept of factory focus will be examined in detail and aspects of the Japanese philosophy of manufacturing will be explored. The remainder of the course will take three different, and distinct, approaches to strategic issues. The first is an "industry" approach where different manufacturing strategies prevailing within a particular industry will be examined. The second is a "decision" approach where company handling of a specific type of decision (e.g., new capacity, vertical integration, process



modernization) will be contrasted across industries. The third is an “external environment” approach where the impact on manufacturing of a particular external force (e.g., regulation, energy price inflation), will be assessed.

472. Operations Management in the Service Sector. Examines the strategic and tactical problems associated with the management of diverse service systems such as hospitals, banks, transportation companies, restaurants, and professional service firms. The course focuses on designing or improving service delivery.

473. Management of Technology. Examines the role of technological changes in improving productivity and in developing new products and services. The process of introducing new technology to the firm’s production system is explored, along with issues in the management of research and development. Other topics include adaptation strategies, technology transfer, technology assessment/forecasting, and government policies toward technology and innovation. Organization contexts include manufacturing, services, hospitals and public agencies.

480. The International Environment. Examines the environment in which multinational firms operate. It includes a discussion of current policy issues such as balance of payments, trade policy, and economic development. Special emphasis is given to the theory of the multinational firm and its role as a participant on the economic scene. That role is evaluated from the perspective of both the firm itself and the countries in which the firm operates.

482. International Finance. Provides the background necessary to recognize and analyze the financial problems facing a firm that operates in an international environment. This will be accomplished by developing a theoretical framework which describes the international environment and using that as background, studying specific financial problems related to multinational business.

490. The Practicum. Gives the student a significant experience in applying the concepts, theories, and methods of analysis learned in the program to a real, complex problem of an economic enterprise. It should include the analysis of a situation and the explicit formulation of a problem. The important task of identifying and specifying the problem is an integral part of the course. The practicum report should propose a solution to the problem and should contain the supporting explanation and logic. The solution should be one that can be implemented, not requiring unavailable resources. Prerequisite: second-year standing in the M.B.A. program and consent of the Director of the M.B.A. Program and instructor.

491.1–9. Special Topics in Management. Permits the study of special topics in management on an occasional basis depending on the availability and interests of students and faculty. Examples of special topics include project management, environmental regulation, transnational corporations, and legal and tax aspects of entrepreneurship.

499. Independent Study. Allows the student an opportunity to engage in a study of special topics on an individual basis under the supervision of a faculty member. Prerequisite: second-year standing in the M.B.A. program and consent of the Director of the M.B.A. Program and instructor.

Doctor of Philosophy

These 500-level courses are available for Ph.D. students and qualified M.B.A.’s in the areas of accounting, marketing, operations management, finance, and organizational behavior. Typically one in each area will be offered each year. These courses are open to M.B.A. students desiring rigorous depth in an area with permission of the instructor. Unless specified otherwise, each course is worth three units of credit.

531. Financial Accounting Seminar. Examines the nature of published financial statement information and its relationship with various economic variables. The list of related variables might include stock market data, bankruptcy filings, and the actions of various users of financial statement information, including management, investors, creditors, and regulators. The focus is on the current research methodologies and research efforts used to analyze the above relationships, as well as consideration of the underlying theoretical concepts. A background in masters-level accounting and finance is assumed.

532. Management Accounting Seminar. Examines information systems and their use in facilitating management decision making and organizational control. Emphasis will be placed on the appropriate research methodologies and paradigms including information economics, decision theory, and organizational theory. Topics include but are not limited to budgeting, incentive systems, performance evaluation, variance investigation, and cost allocation.

541. Organization Seminar—A Micro Focus. Focuses on individual and small group behavior in organizations. Theories of motivation, decision making, interpersonal behavior, group processes, and leadership are discussed. The course emphasizes a variety of research approaches and methods. The course will also include presentation of behavioral research by faculty members of the Fuqua School of Business and by other researchers.

542. Organization Seminar—A Macro Focus. Focuses on the organization and the subunits which make up the organization. Theories of organization, structure, decentralization, divisionalization, functional area integration, task design, incentives and rewards, information systems, and decision rules are discussed. These issues are developed with an orientation toward their choice and design for high performance. Throughout the course, there is an emphasis on appropriate research approaches and methods to investigate theoretical issues in various research settings. The course will also include presentation of research by faculty members of the Fuqua School of Business and by other researchers.

551. Corporate Finance Seminars. Introduces the student to research areas in corporate finance. The emphasis of the course will depend on the research interests of the instructor, with one or more of the following topic areas to be explored in depth: capital budgeting, capital structure, mergers and acquisitions, financing alternatives, dividend policy, valuation methods, cost of capital, international finance, and cash management.

552. Investment Seminar. Surveys research in the investment area and explores in depth one or more problems in which research is currently active. The emphasis will be determined by the instructor from one or more of the following areas: valuation of risky securities, capital asset pricing model and extensions, capital market efficiency, portfolio theory, options and warrants, investment management, microstructure of security markets, and futures contracts.

561. Seminar in Quantitative Research in Marketing. Presents an overview of the quantitative techniques which are important in marketing research. Each model and technique will be examined in considerable detail so as to permit an understanding of its assumptions, structure, and usefulness. Topics covered will include the general data analysis techniques as well as models from advertising, new products, and pricing decisions.

562. Seminar in Behavioral Models in Marketing. Examines the development of research in consumer behavior. Major emphasis is given to theoretical developments and empirical research with a range of articles assigned for each topic. Topics include

motivation and personality, perceptual processes, information search, choice processes, attitudes and persuasion, learning, and influence in consumer choice.

571. Operations Strategy Seminar. Pursues the latest developments in the strategy of operations in both the manufacturing and service sectors. Topics include the focused factory concept, Japanese manufacturing philosophy, technological policy toward new process development and toward new product introduction, vertical integration, choice of capacity and location, industry analysis, and the impact of government regulation. The seminar emphasizes the development of hypotheses about strategic topics and the empirical means by which they can be tested.

572. Seminar in Operational and Technological Tactics. Examines current issues in the day-to-day management of manufacturing and service delivery systems. Topics include material requirements planning, capacity requirements planning, quality of work life projects, productivity measurement and enhancement, implementation of new product introductions and production process modifications, quality assurance, production planning and scheduling, and logistics. The seminar concentrates on (1) the substance of recent developments, (2) the generation and test of hypotheses about tactical issues, and (3) the applicability of various optimization techniques to the advance of operation tactics.

597. Dissertation Research. For students actively pursuing research on their dissertation. Prerequisites: student must have passed the preliminary examination and have the consent of the Director of the Doctoral Program and the instructor. Credit to be arranged. *Staff*

598. Independent Study. Allows the doctoral student the opportunity to engage in study or tutorial on special topics on an individual basis under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

599. Directed Research. Allows the doctoral student to engage in individual research projects under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

Faculty



Faculty

The faculty of the Fuqua School of Business has a diverse educational and professional background. This diversity provides students with the opportunity to explore wide-ranging aspects of the environment in which they will live and work after completing their educational experience.

The student-faculty ratio in the school is maintained at a level permitting development of close professional relationships and encouraging individual assistance in academic and professional relationships. The student-teaching faculty ratio is about nine to one. In addition, faculty engaged in major research projects and other teaching assignments are available to work with students. This balance is advantageous for both students and faculty in their joint work.

A brief description of the background and main areas of interest of the faculty follows:

Helmy H. Baligh, Ph.D., *Professor of Business Administration*; B.A. (Oxford University), M.B.A., Ph.D. (University of California, Berkeley).

Professor Baligh joined the Duke faculty after teaching at the University of Illinois. His major research is in the analysis and design of economic structures for both business and social purposes. He has participated in the development of the Master of Business Administration programs at Duke and at the University of Illinois with emphasis on curriculum. His publications include *Vertical Market Structures* (with Leon E. Richartz) and several articles in the areas of transportation, hospital administration, marketing, economics, and organization structure design. He teaches in the fields of marketing, economic decision making, and organization design.

Joseph Battle, Ph.D., *Associate Professor of Business Administration*; B.S. (North Carolina Central University), M.S., Ph.D. (University of Michigan).

After serving as Special Assistant to the President of Shaw University, Professor Battle joined the Duke faculty, teaching in the areas of mathematics, probability and statistics, and economics. Research and consulting interests include the evaluation of federally funded poverty agencies with the Research Triangle Institute and local Durham organizations.

Donald S. Beilman, B.E.E., *Adjunct Professor of Business Administration*; B.E.E. (Cornell University).

Donald S. Beilman is currently President of the Microelectronics Center of North Carolina. His background includes thirty years of corporate experience with General Electric, where he had most recently held the position of Vice President-General Manager, Advanced Microelectronics Operations. His specific areas of experience include applied research and engineering, product design, manufacturing, strategic planning (including quality and innovation strategy management), and general management for both defense and commercial business.

James R. Bettman, Ph.D., *Burlington Industries Professor of Business Administration, Director of the Ph.D. Program, and Area Coordinator of Marketing*; B.A., M.Phil., Ph.D. (Yale University).

Prior to joining the Fuqua School of Business, Professor Bettman taught at the Graduate School of Management, University of California, Los Angeles. He is the author of *An Information Processing Theory of*

Consumer Choice as well as numerous articles in academic journals. Professor Bettman has also served as a consultant to government agencies, as a member of editorial boards of scholarly publications, and as a participant in numerous forums. He is currently coeditor of the *Journal of Consumer Research*.

William Boulding, *Instructor*; B.A. (Swarthmore College), Ph.D. anticipated January 1985 (University of Pennsylvania).

Professor Boulding is interested in model building relevant to managerial decision making, particularly in the area of advertising. His current research is concerned with using panel data on purchase and viewing behavior to better specify a media schedule for a firm. His teaching interests lie in the areas of advertising management and marketing research.

Marian C. Burke, Ph.D., *Assistant Professor of Business Administration*; B.A. (College of William and Mary), M.S. (Virginia Commonwealth University), Ph.D. (University of California, Los Angeles).

Professor Burke's teaching interests include marketing strategy and planning, competitive analysis, and product management. Her current research activities are focused on an examination of the decision rules used by marketing managers in selecting marketing strategies and on issues of advertising effectiveness.

Richard M. Burton, D.B.A., *Associate Professor of Business Administration*; B.S., M.B.A., D.B.A. (University of Illinois).

Professor Burton's primary research interests are in the design and management of organizations. His research is concerned with the design of the firm for coordinated operations across the functional areas of marketing, strategy, production, finance, and information systems. He teaches courses in organization design, management of innovation and research, and corporate structure and planning. Recent consulting experience includes projects for Siecor and Bell Canada.

Robert J. Capettini, Ph.D., CPA, *Associate Professor of Business Administration*; B.B.A., M.B.A., (University of Toledo), Ph.D. (University of Illinois).

Prior to joining the Fuqua School faculty, Professor Capettini taught at the University of Iowa. His research interests are in the areas of managerial applications of quantitative and behavioral decision models and cost estimation and control in the health care field. His current research centers both on the economic analysis of financial leases and on measuring the efficiency of organizations. He is chairman of the Instructional Committee of the American Accounting Association's Management Accounting Section. Professor Capettini also has been actively engaged in teaching executive development programs.

Kalman J. Cohen, Ph.D., *Distinguished Bank Research Professor*; B.A. (Reed College), M.Litt. (Oxford University), M.S., Ph.D. (Carnegie-Mellon University).

Prior to joining the Duke faculty, Professor Cohen served for two years as Distinguished Professor of Finance and Economics and as the first Director of the Salomon Brothers Center for the Study of Financial Institutions at New York University. He also spent fourteen years on the faculty of Carnegie-Mellon University's Graduate School of Industrial Administration. He has written six books and over eighty articles in the areas of banking and finance, strategic planning, economics, management science, and computer simulation. He has pioneered in the applications of management science techniques in banking; his current research focuses on the microstructure of security markets.

Ellen F. Cox, Ph.D., *Assistant Professor of Business Administration*; B.A. (University of Santa Clara), M.B.A., Ph.D. (University of California, Berkeley).

Professor Cox teaches in the area of financial accounting. Her current research interests include the impact of information on security prices, accounting policy formulation, and auditor liability.

David C. Dellinger, Ph.D., *Associate Professor of Business Administration*; B.S. (Duke University), M.S., Ph.D. (Stanford University).

Professor Dellinger's current research involves developing cost-effectiveness methodology for evaluating programs of care for the aged. This research is sponsored by the Duke Center for the Study of Aging and Human Development in which he is a senior fellow. He has also done consulting work for the United States Senate Committee on Armed Services dealing with Officer Manpower Management Systems. His teaching fields include operations research and economics, and he has been active in curriculum development with the Duke Master of Business Administration Program.

Robert L. Dickens, M.S., CPA, *Professor of Accounting and Director of Undergraduate Studies*; B.S., M.S. (University of North Carolina).

Professor Dickens specializes in financial accounting and auditing. He has held offices in national organizations including Vice-President of the American Accounting Association and Chairman of the Committee on Education of the American Institute of Certified Public Accountants. He has served as consultant to the U.S. Office of Education and the U.S. Department of Agriculture on accounting and reporting matters. In 1966 he was awarded an honorary degree, LLD, by Elon College.

David A. Dittman, Ph.D., *Associate Professor of Business Administration and Area Coordinator for Accounting*, B.B.A. (University of Notre Dame), M.A., Ph.D. (Ohio State University).

Professor Dittman teaches managerial accounting as it applies in both business and health care organizations. His research interest centers on the generation, use, and impact of accounting data on managerial decisions. He has published numerous articles in leading accounting and health care management journals. Professor Dittman taught at Northwestern University for five years before joining the Fuqua faculty in 1978. His current research interest centers on the efforts of federal regulation upon the health care systems in the United States. He is consultant to several hospitals and professional health care associations. He recently coauthored a book entitled, *Hospital Cost Containment Programs: A Policy Analysis*. He is Director of the Center for the Study of Accounting. He is a member of the American Accounting Association's Advisory Committee on Accounting Education.

Julie A. Edell, Ph.D., *Assistant Professor of Business Administration*, B.A. (University of Nebraska), M.S., Ph.D. (Carnegie-Mellon University).

Professor Edell's teaching interests are in the area of marketing, with emphasis on advertising, marketing management, consumer behavior, and marketing research. Her current research is concerned with examining the effect of advertising communications upon consumer purchase behavior. She has recently published in the *Journal of Consumer Research*.

John D. Forsyth, D.B.A., *Professor of Business Administration and Area Coordinator for Finance and Economics*; B.A. (Queen's University), M.B.A. (University of Detroit), D.B.A. (University of Illinois).

Prior to coming to Duke, Professor Forsyth was Professor of Business Administration and Director of the Program for Executive Development at IMEDE Management Development Institute in Lausanne, Switzerland. His teaching and research interests are in the areas of international financial management, the planning and control of capital investments, and the design of corporate strategies.

John P. Gallagher, Ph.D., *Director, Computer Education Center*; B.A. (University of California, Berkeley), Ph.D. (University of California, Santa Barbara).

John Gallagher joined the Fuqua School of Business in September, 1983. He has extensive teaching experience in computer applications to education and problem solving. He has a range of research interests in the area of instructional psychology with a particular focus upon the applications of artificial intelligence to computer-based instruction.

Grant W. Gardner, Ph.D., *Assistant Professor of Business Administration*; B.S. (Southern Methodist University), A.M., Ph.D. (Harvard University).

Professor Gardner's primary areas of research are macroeconomics and international economics. His current research interest is central bank policy in an open economy. He teaches macroeconomics and international trade.

W. Clay Hamner, D.B.A., *Adjunct Professor of Business Administration*; B.B.A., M.A. (University of Georgia), D.B.A. (Indiana University).

Professor Hamner teaches in the areas of organizational behavior, personnel management, and new venture management. He has published over thirty articles in the areas of bargaining strategies, applied motivation theories, equal employment opportunity, and predicting unionization. He has also consulted in these same areas for such companies as Sears, Marathon Oil Company, Clark Equipment, Pepsi, Chemical Bank, and the U.S. Savings Loan League among others. Prior to coming to Duke University, Professor Hamner taught at Indiana University and Northwestern University. Professor Hamner is the coauthor of six textbooks in the field of organizational behavior and personnel management.

Christine R. Hekman, Ph.D., *Associate Professor of Business Administration*; B.S. (Valparaiso University); Ph.D. (University of Chicago).

Professor Hekman joined the Fuqua School of Business in September, 1981. She previously taught at the Harvard Business School for six years. Her primary field of interest is in the area of international finance, but she also has worked in corporate finance. Her work has appeared in several leading academic and managerial journals and she has coauthored a casebook in international finance. She serves on the editorial boards of *Journal of International Business Studies* and *Financial Management* and as an occasional referee for other leading journals. She also consults and conducts executive seminars for several major international banks and corporations.

Robert E. Hoskin, Ph.D., *Assistant Professor of Business Administration*; B.S. (Ohio State University), M.S. (Bowling Green State University), M.A., Ph.D. (Cornell University).

Professor Hoskin joined the Fuqua School of Business in September, 1980. His teaching interest is in the area of financial accounting. He has published in *Financial Management* and the *Journal of Accounting Research* and serves on the editorial board of the *Accounting Review*. Professor Hoskin's research interests currently include behavioral decision theory and inflation accounting.

Joel C. Huber, Ph.D., Associate Professor of Business Administration and Director of the Executive M.B.A. Weekend Program, B.A. (Princeton University), M.B.A. (Wharton Graduate Division, University of Pennsylvania), Ph.D. (University of Pennsylvania).

Professor Huber comes to the Fuqua School of Business from the Business School at Columbia University and the Krannert Graduate School of Management, Purdue University. His teaching interests are in the areas of marketing and market research. He is a member of the American Marketing Association, the Association for Consumer Research, and the Psychometric Society.

John S. Hughes, Ph.D., CPA, Associate Professor of Business Administration; B.S. B.A. (Northeastern University), M.S. (University of Massachusetts), Ph.D. (Purdue University).

Prior to coming to Duke, Professor Hughes was on the faculty of the Amos Tuck School of Business, Dartmouth College. In addition to his primary discipline of accounting, he also has research interests in finance and management science. His publications include articles in several leading journals. He is an associate editor for the *Journal of Accounting and Economics*, a former editorial consultant for the *Accounting Review*, and a referee for several leading journals. His teaching interests are in financial accounting.

Kirk R. Karwan, Ph.D., Assistant Professor of Business Administration; B.E.S., M.S.E. (The Johns Hopkins University), Ph.D. (Carnegie-Mellon University).

Professor Karwan served previously on the faculty of the School of Business at Tulane University where he taught courses in management science and management information systems. His research interests concern the use of quantitative techniques and computers as aids in decision making. He has published articles that deal with a variety of problem areas including environmental protection, financial planning, and emergency management. He presently is involved in research in the area of manufacturing decision support systems.

Thomas F. Keller, Ph.D., CPA, R. J. Reynolds Industries Professor of Business Administration and Dean; A.B. (Duke University), M.B.A., Ph.D. (University of Michigan).

Professor Keller specializes in accounting. His current research and teaching interests are principally in the areas of financial accounting and reporting. He has held several offices in the American Accounting Association, including Editor of the *Accounting Review* (1972-75). He is the coauthor and coeditor of several books in financial accounting. During the summer and fall of 1975 under the auspices of a Fulbright grant, he lectured in Australia and the Far East on a variety of topics related to the development of accounting theory and standards.

Dan J. Laughhunn, D.B.A., Professor of Business Administration and Area Coordinator for Quantitative Methods and Operations Management. B.S. (Engineering Mechanics), M.B.A., D.B.A. (University of Illinois).

Professor Laughhunn has served as a consultant to industry and universities on a variety of topics related to planning and budgeting. His teaching and research interests deal with the application of quantitative techniques to problems in production and finance. Professor Laughhunn also has been actively engaged in teaching executive development programs, both at Duke and at other universities.

Arie Y. Lewin, Ph.D., Professor of Business Administration; B.S., M.S. (University of California, Los Angeles), M.S., Ph.D. (Carnegie-Mellon University).

Prior to coming to Duke, Professor Lewin was on the faculty of New York University for eight years. His research interests have been focused on applications of behavioral science to specific functional areas, organization design, person perception, and business participation in the formulation of public policy. Current research involves new approaches to measuring the effectiveness and efficiency of organizations and organization redesign, state owned enterprises in international trade, and the social, legal, and political environment of business. Professor Lewin is the coauthor of three books and his papers have appeared in numerous academic journals. Professor Lewin is the Organization Design Department Editor of *Management Science*.

Frederick W. Lindahl, Instructor. B.S. (United States Air Force Academy), M.B.A. (Harvard University), Ph.D. anticipated December 1984 (University of Chicago.)

Professor Lindahl spent several years in public accounting prior to joining Duke. Financial accounting is his primary research interest, his current research being an empirical probability model of selection of accounting principles.

John M. McCann, Ph.D., Associate Professor of Business Administration; B.S.M.E., M.B.A. (University of Kentucky), Ph.D. (Krannert Graduate School of Industrial Administration, Purdue University).

Professor McCann served on the faculty of the Graduate School of Business and Public Administration at Cornell and has been a consultant with an economic modeling and research firm. His teaching interests are in the areas of marketing and econometrics. His current research involves the interface between marketing management and computerized management information systems.

Wesley A. Magat, Ph.D., *Associate Professor of Business Administration and Director of the Executive M.B.A. Evening Program*; A.B. (Brown University), M.S., Ph.D. (Northwestern University).

Professor Magat teaches primarily in the fields of managerial economics and regulatory management. He is currently involved in research in the areas of toxic chemicals regulation, energy policy, rule-making procedures and reform, and advertising management. He is an Associate and past Director of the Duke Center for the Study of Business Regulation.

Steven F. Maier, Ph.D., *Adjunct Professor of Business Administration*, B.S. (Cornell University), M.S., Ph.D. (Stanford University).

Professor Maier is President and CEO of UAI Technology, Inc. and its University Analytics division. The company is based in the Research Triangle Park, N.C. and serves 200 banks and public utilities with its data products and computer models. Dr. Maier's research interests are in cash management and the microstructure of security markets. He is the author or coauthor of over forty journal articles and two books. He has also been active in Duke's executive development programs.

Joseph B. Mazzola, Ph.D., *Assistant Professor of Business Administration*, B.S. (State University of New York at Stony Brook); M.A. (Wake Forest University); M.S., Ph.D. (Carnegie-Mellon University).

Professor Mazzola's teaching and research interests are in the areas of production operations management, management science, and operations research. His current research involves topics arising in operations scheduling, production and inventory control, and mathematical programming. Prior to coming to Duke, Professor Mazzola served on the faculty of the University of North Carolina at Chapel Hill.

Richard C. Morey, Ph.D., *Professor of the Practice of Management Science*, B.S. (Syracuse University), M.A., Ph.D. (University of California, Berkeley).

Professor Morey came to Duke with extensive business experience, having founded a management consulting firm and served as a consultant to many major businesses and governmental agencies. He has also been an Adjunct Professor at Stanford and George Washington Universities. He teaches in the areas of operations research and strategy. As Director of the Center for Applied Business Research, he coordinates research efforts of the faculty related to government and foundation grants and contracts.

Thomas H. Naylor, Ph.D., *Professor of Economics and Professor of Business Administration*, B.S. (Millsaps College), B.S. (Columbia University), M.B.A. (Indiana University), Ph.D. (Tulane University).

Professor Naylor has been a member of the faculty of the Department of Economics at Duke University since 1964. He is the author of 22 books and over 125 articles. Professor Naylor's consulting experience includes service to over 100 national and international organizations. He has lectured at universities throughout the world and is a member of several editorial boards. He is Director of the Center for Corporate Economics and Strategy at Duke.

Richard B. Palmer, Ph.D., *Executive-in-Residence*; A.B. (Lehigh University), Ph.D. (The Johns Hopkins University).

Prior to joining the Fuqua School of Business, Dr. Palmer held the position of President of Texaco Canada, Inc. His thirty-two-year career with Texaco has included worldwide responsibilities.

John W. Payne, Ph.D., *Professor of Business Administration and Area Coordinator for Organizational Behavior*, B.A., M.A., Ph.D. (University of California, Irvine).

Prior to coming to Duke, Professor Payne was on the faculty of the Graduate School of Business at the University of Chicago. His primary research activities deal with individual decision behavior. He has investigated decision making under risk, consumer choice behavior, and the design of computer-based support systems. He teaches courses in organizational behavior and consumer behavior.

David W. Peterson, Ph.D., *Adjunct Professor of Business Administration*; B.A. (University of Wisconsin), M.S., Ph.D. (Stanford University).

Professor Peterson's teaching and research activities are in the fields of mathematical modeling, statistical analysis, and operations research. His recent publications have dealt with control theory, portfolio selection, long- and short-range planning, and regulated utilities. He is a consultant to corporate and governmental litigation teams on matters pertaining to the structuring of statistically based legal positions.

Christopher D. Piros, Ph.D., *Assistant Professor of Business Administration*; B.A., M.A. (Northwestern University), A.M., Ph.D. (Harvard University).

Professor Piros' research interests include portfolio theory, the structure of financial markets, and monetary economics. He teaches courses in investments, capital markets, and macroeconomics.

Robert E. Reinheimer, Ph.D., *Assistant Professor of the Practice of Management Communications*, B.A., M.A. (California State University, Fullerton), Ph.D. (University of Kansas).

Professor Reinheimer comes to the Fuqua School of Business from the University of Virginia. His primary areas of interest are in speech communication and small group communications. He has taught a number of courses and executive development programs in these areas, and he is responsible for the Management Communications courses in the M.B.A. and Executive M.B.A. programs.

Lucy J. Reuben, Ph.D., *Assistant Professor of Business Administration*; A.B. (Oberlin College), M.B.A., Ph.D. (University of Michigan).

Professor Reuben teaches in the area of finance. Her teaching and research interests are in financial intermediation, financial infrastructure and economic development, and strategic planning. She is coeditor of an anthology on black economic development (*Black Economic Development: Analysis and Implications* with W. L. Cash, Jr.). Professor Reuben has written articles in the areas of banking and corporate financial policy, and she has been employed as a financial analyst for Ford Motor Company World Headquarters. She has also served as Visiting Professor at the Board of Governors of the Federal Reserve System.

William E. Ricks, Ph.D., CPA, *Assistant Professor of Business Administration*; B.S. (University of New Orleans), Ph.D. (University of California, Berkeley).

Professor Ricks joined the Fuqua School of Business in September, 1980. He has had extensive teaching experience in both managerial and financial accounting in the M.B.A. program at the University of California at Berkeley. He holds a CPA certificate in Louisiana and has wide audit experience in oil, gas, and banking. His major research interest is financial accounting, at both the individual and market level. His published research focuses on the stock market's reaction to accounting information.

Elaine Romanelli, *Instructor*; A.B. (University of California, Berkeley); M.B.A., Ph.D. anticipated January 1985 (Columbia University).

Professor Romanelli teaches in the areas of organization behavior and new venture management. Her research interests include the strategies and processes of organization creation, and patterns of evolution for both new and large firms. She has published in *Management Science* and *Research in Organizational Behavior*.

Roger W. Schmenner, Ph.D., *Associate Professor of Business Administration and Director of the M.B.A. Program*; A.B. (Princeton University), M.Phil., Ph.D. (Yale University).

Formerly a member of the faculty of the Harvard Business School, Professor Schmenner teaches in the area of operations management. His fields of research interest include industry location, multiplant manufacturing management, manufacturing strategy, and productivity. He is the author of an operations management textbook as well as a book on industry location decision making. His numerous articles have been published in both economic and managerial journals. He has consulted widely for industrial clients and some government organizations.

Herbert L. Schuette, Ph.D., *Assistant Professor of Business Administration*; B.B.A., M.B.A., Ph.D. (University of Michigan).

Professor Schuette teaches in the area of operations management. His research interests are in the management of technology and innovation, the microeconomics of industry growth and productivity, and computer simulation of firm behavior. Prior to joining the Duke faculty in 1981, Professor Schuette served on the faculty of the School of Management at Boston University. For two years he also was assistant to the Michigan Banking Commissioner, in charge of regulatory policy for electronic funds transfer systems.

James E. Sheldon, L.L.M. *Adjunct Assistant Professor of Business Administration*; B.A. (Dartmouth College), J.D. (University of California), L.L.M. (Boston University Law School), L.L.M. (University of Stockholm).

Before joining the Fuqua School of Business, Mr. Sheldon practiced corporate, securities, and tax law for seven years in Boston and San Francisco. His teaching and research interests include business and tax planning. He is a member of the California, Massachusetts, and North Carolina Bar Associations.

Blair H. Sheppard, Ph.D., *Assistant Professor of Business Administration and Director of the Center for Human Resource Management*; B.A., M.A. (University of Western Ontario), Ph.D. (University of Illinois, Urbana).

Professor Sheppard joined the Fuqua School of Business from the faculty of Management at McGill University. He teaches in organization behavior, personnel management, and industrial relations. His research interests include conflict resolution and group effectiveness. He has published in the *Journal of Personality and Social Psychology*, *Research in Organizational Behavior*, and *Journal of Applied Social Psychology*. His consulting has been in the area of human resource management.

Richard Staelin, Ph.D., *Edward and Rose Donnell Professor of Business Administration and Associate Dean for Faculty Affairs*; B.S., M.B.A., Ph.D. (University of Michigan).

Professor Staelin has served as Professor and Associate Dean at the Graduate School of Industrial Administration, Carnegie-Mellon University, and has been a Visiting Professor at the Australian Graduate School of Management and at the University of Chicago. His professional activities include consulting work for both the public and private sectors, active participation in professional associations, service on editorial boards of four academic journals, and publication of a book and over 40 journal articles. He is presently Area Editor of *Marketing Science*. Professor Staelin's current research interests include information search and channel management.

Jens A. Stephan, *Instructor*; B.S.M.E. (University of Michigan), M.B.A. (Pennsylvania State University), Ph.D. anticipated January 1985 (Cornell University).

Professor Stephan's teaching interests are in managerial and financial accounting. He has done research on the ability to measure the impact of firm-specific events on security prices, and his current research investigates the role of prices as a source of information for security market traders.

Anne S. Tsui, Ph.D., *Assistant Professor of Business Administration*; B.A., M.A. (University of Minnesota); Ph.D. (University of California, Los Angeles).

Professor Tsui teaches in organization behavior and human resources management. Her research interests focus on the effectiveness of managers and the human resource management function. She has published in the journals of *Organizational Behavior and Human Performance*, *Industrial Relations*, and the *Academy of Management Journal*. Her professional experience includes employment and consulting with Control Data Corporation.

James H. Vander Weide, Ph.D., *Adjunct Professor of Business Administration*, B.S. (Cornell University), Ph.D. (Northwestern University).

Professor Vander Weide's primary research and teaching interests are in the areas of corporate finance and managerial economics. He has written papers on topics such as cash management, capital budgeting, portfolio analysis, and the economic effects of government regulation. He has also served as a consultant to banks in the area of cash management. He has testified as an expert witness on the cost of capital before the Public Utility Commission of several states.

W. Kip Viscusi, Ph.D., *Professor of Business Administration, Professor of Public Policy Sciences and Director of the Center for the Study of Business Regulation*; A.B., M.P.P., A.M., Ph.D., (Harvard University).

Professor Viscusi teaches microeconomics, regulation, and labor economics. He formerly served as a Deputy Director of the White House Council on Wage and Price Stability in the Carter administration. His research, which has been published widely in a number of books and articles, has focused on regulatory issues, labor economics, and the economics of uncertainty. His recent publications include a book on risk regulation, a monograph on the Consumer Product Safety Commission, and numerous articles. He has testified twice before the Joint Economic Committee and has given speeches to both business and government groups. Professor Viscusi is a nationally recognized expert in the economics of health and safety standards.

Michael Warner, Ph.D., *Associate Professor (Part-time)*; B.A., M.A. (Duke University), Ph.D. (Tulane University).

Professor Warner taught in the Department of Health Administration at Duke prior to joining the Fuqua School of Business faculty. His research interests are in planning, decision making and control in health administration, and in applications of operations research modeling to planning and management of the delivery of health care.

Robert L. Winkler, Ph.D., *IBM Research Professor of Business Administration*; B.S. (University of Illinois), Ph.D. (University of Chicago).

Prior to joining the Duke faculty, Professor Winkler served as Distinguished Professor of Quantitative Business Analysis at Indiana University, and he has held visiting positions at the University of Washington, the International Institute for Applied Systems Analysis, Stanford University, and INSEAD. His primary research interests involve Bayesian statistics, decision analysis, risk assessment, and probability forecasting. Professor Winkler is the author of numerous research articles and books, is Departmental Editor for *Decision Analysis for Management Science*, and serves on the editorial boards of several other journals.

William L. Yaeger, J.D., *Adjunct Associate Professor of Business Administration*; B.A. (Duke University), J.D. (Emory University).

Mr. Yaeger teaches the course Legal Environment of the Firm. He is in private practice in Durham, North Carolina, with an emphasis on bankruptcy and insolvency. Mr. Yaeger is a member of the North Carolina Bar Association and the National Association of Bankruptcy Trustees.

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DUKE UNIVERSITY



OFFICE OF THE UNIVERSITY ARCHITECT
DEPARTMENT OF PHYSICAL PLANNING
JAMES A. WARD — DIRECTOR

0 200 400



WEST CAMPUS 77XX

- 1 DURE CHAPEL 5D
- 2 GRAY BUILDING 5D
- 3 DIVINITY SCHOOL 5D
- 4 PERKINS LIBRARY 5D
- 5 LANGUAGE CENTER 5D
- 6 OLD CHEMISTRY BUILDING 8D
- 7 DIVINITY SCHOOL ADDITION 5D
- 8 SOCIOLOGY PSYCHOLOGY BUILDING 18D
- 9 SOCIAL SCIENCES BUILDING 8D
- 10 CRAVEN QUAD 5E
- 11 CROWELL QUAD 5E
- 12 KILGORE QUAD 5E
- 13 UNION BUILDING 5D
- 14 FLOWERS BUILDING 5D
- 15 PAGE AUDITORIUM 5D
- 16 CARD GYMNASIUM 4F
- 17 WALLACE WADE STADIUM 4F
- 18 UNDERGRAD ADMISSIONS & FINANCIAL AID
- 19 INSTITUTIONAL ADVANCEMENT OFFICE 7E
- 20 UNIVERSITY RELATIONS 7E
- 21 ALUMNI AFFAIRS 7E
- 22 2111 CAMPUS DRIVE 7E
- 23 CENTER FOR INTERNATIONAL STUDIES 7E



- 6 PSYCHOLOGICAL SERVICES (BE)
- 7 ISLAMIC & ARABIAN DEVELOPMENT STUDIES (7E)
- 8 PHYSICAL PLANNING/INTERNAL AUDIT (BE)
- 9 DEMOGRAPHIC STUDIES (7E)
- 1 DUKE GARDENS GREENHOUSES (BD)
- 3 GARDENS EQUIPMENT BUILDING (BD)
- 5 FINCH-YEAGER BUILDING (4F)
- 2 FEW QUAD (3E)
- 3 CAMERON INDOOR STADIUM (4F)
- 4 SUB STATION #4 (5F)
- 6 SUB STATION #5 (3C)
- 7 TELECOMMUNICATIONS BUILDING (5C)
- 8 ENGINEERING BUILDING (5C)
- 9 ENGINEERING BUILDING ADDITION (5C)
- 6 PHYSICS BUILDING (4C)
- 7 DR. HART'S RESIDENCE (5G)
- 3 ALLEN BUILDING (BD)
- 4 HEATING PLANT (5C)
- 6 WARWICKER HALL (5E)
- 6 NORTH BUILDING (5C)
- 7 VAN DE GRAFF BUILDING (4D)
- 8 BIOLOGICAL SCIENCES BUILDING (4D)
- 6 LAW BUILDING (3E)
- 7 FORD SCHOOL OF BUSINESS (3E)
- 2 FACULTY CLUB (7F)
- 4 PRIVATE FACILITY
- 6 P.M. GROSS CHEMICAL LABORATORY (3D)
- 6 TEER ENGINEERING LIBRARY BUILDING (5C)
- 7 NUCLEAR LABORATORY (4C)
- 6 FEW QUAD EQUIPMENT BUILDING (5E)
- 6 PHYTO-TOTCH BUILDING (5C)
- 6 BIO-SCIENCES GREENHOUSES (4D)
- 3 FIELD HOUSE (4G)
- 6 GOLF COURSE CLUB STATION
- 5 INTRAMURAL BUILDING (5F)
- 6 GOLF COURSE CADDY HOUSE (3G)
- 6 GOLF COURSE CLUB HOUSE (2G)
- 6 GOLF COURSE TOOL HOUSE
- 6 TABARD HALL (BE)
- 6 GOLF COURSE (BE)
- 6 LANCASTER HOUSE (BE)
- 6 COOMBS BASEBALL STADIUM (4F)
- 11 BRYAN CENTER (5D)
- 6 GRADUATES (7F)
- 6 EXPERIMENTAL BOTANY PLOT & BLDG (2F)
- 17 TOOL STORAGE WAREHOUSE (4G)
- 8 STORAGE BUILDING (4G)
- 6 ATHLETIC & P.E. FACILITIES
- 6 SWIMMING POOL (5F)

MEDICAL CENTER 75XX

- 1 GERONTOLOGY (BC)
- 2 O & T NO 3 (BC)
- 3 CLINICAL RESEARCH NO 1 (BC)
- 5 MAIN ENTRANCE HOSPITAL (BC)
- 5 CLINICAL RESEARCH NO 2 (BC)
- 6 BAKER HOUSE (BC)
- 7 SCHOOL OF MEDICINE (BD)
- 8 DUKE HOSPITAL SOUTH (BC)
- 9 BELL BUILDING (BB)
- 10 HANES ANNEX (7B)
- 11 HANES HOUSE (BB)
- 12 TRENT DRIVE HALL (7B)
- 13 MARSHALL H. DUKE BUILDING (MS1) (5C)
- 14 HEALTH CARE SYSTEMS (BB)
- 15 MARSHALL PROGENS REHAB CENTER (7B)
- 16 BIOMATHEMATICS (BB)
- 17 RESEARCH PARK BLDG NO 1 (4B)
- 18 RESEARCH PARK BLDG NO 2 (4B)
- 19 RESEARCH PARK BLDG NO 3 (4C)
- 20 RESEARCH PARK BLDG NO 4 (4B)
- 21 CHILD GUIDANCE CLINIC (7A)
- 24 VIVARIUM (4B)
- 25 EMPLOYEE RELATIONS (BB)
- 26 TEMPORARY SERVICES (BB)
- 27 CIVILIAN BUILDING (BA)
- 28 2242 ERMING ROAD (BB)
- 29 VOLATILE STORAGE (BC)
- 30 ALEX H. SANDS JR. BLDG (MS-1-B) (5B)
- 31 EYE CENTER (5B)
- 32 SEELEY G. MIDD BLDG. M.C. LIBRARY (5C)
- 33 2212 ERMING ROAD (BB)
- 34 SUB STATION NO 1 (4B)
- 35 SUB STATION NO 2 (7B)
- 36 M.C. PARKING STRUCTURE #1 (BC)
- 38 NURSING SCHOOL ADDITION (BB)
- 42 ANIMAL LAB ISOLATION FACILITY (ALIF) (4B)
- 43 EDWIN A. MORRIS CLINICAL CANCER BLDG (CR11) (BC)
- 44 PHYSICAL PLANT (BC)
- 47 DUKE HOSPITAL NORTH (BB)
- 48 OLD LAUNDRY RESEARCH BLDG (5C)
- 49 EDWIN L. JONES BLDG (MS1-C) (5B)

- 51 BREAST CANCER DETECTION DEMONSTRATION PROJECT (2C)
- 52 ANALYSIS CENTER (1C)
- 53 M.C. PARKING GARAGE #2 (BB)
- 54 NEARLY NEW SHOPPE (4A)

MEDICAL CENTER 79XX

- 58 M.C. ENGINEERING & OPERATIONS
- 63 PRINTING SHOP

MEDICAL CENTER 80XX

- 52 DUKE HOSPITAL WEST UNIT (2C)

CENTRAL CAMPUS 70XX

- 66 PHYSICAL PLANNING ANNEX (BC)
- 67 PLANT ACCOUNTING (10D)

CENTRAL CAMPUS 71XX

- 1 HOSPITAL LAUNDRY (11E)
- 2 SUB STATION NO 3 (4C)
- 3 MEDICAL CENTER STORAGE BLDG (11E)
- 4 TELEPHONE TERMINAL BLDG (11E)
- 20 ART DEPT. SCULPTURE STUDIO (11E)
- 25 INTERNATIONAL HOUSE (BE)
- 30 2021 CAMPUS DRIVE (RESIDENCE) (BE)
- 34 PLANT ACCOUNTING (10D)
- 35 WAGE & SALARY (BE)
- 36 PUBLIC SAFETY DEPARTMENT (BE)
- 37 TOWNHOUSE APARTMENTS (11D)
- 38 MODULAR HOUSING (10D)
- 44 CENTRAL CAMPUS HOUSING (BC)
- 46 WM. HENRY JORDAN BLDG (PANEL HOUSE) (BD)

EAST CAMPUS 72XX

- 1 EAST DUKE BUILDING (12C)
- 2 WEST DUKE BUILDING (12C)
- 3 AYCOCK RESIDENCE HALL (12C)
- 4 JARVIS RESIDENCE HALL (12C)
- 5 EPWORTH HALL (13C)
- 6 CROWELL SCIENCE (13B)
- 7 THE ARCADE (13B)
- 9 BISHOP'S HOUSE (13B)
- 11 CAMPUS CENTER (12B)
- 14 CAMP BUILDING (12B)
- 15 GILES RESIDENCE HALL (12B)
- 16 EAST CAMPUS LIBRARY (12B)
- 17 AL SPALDON RESIDENCE HALL (12B)
- 18 PEGRAM RESIDENCE HALL (12B)
- 19 BALDWIN AUDITORIUM (12B)
- 20 BASSETT RESIDENCE HALL (13B)
- 21 BROWN RESIDENCE HALL (13B)
- 22 EAST CAMPUS UNION (13B)
- 23 WILSON HOUSE (13B)
- 24 ART MUSEUM (13B)
- 25 SOUTHGATE RESIDENCE HALL (11C)
- 26 MEMORIAL GYMNASIUM (12B)
- 28 BIVINS BUILDING (12B)
- 29 BRANSON BUILDING (12A)
- 30 GILBERT ADDONS RESIDENCE HALL (12C)
- 31 INFIRMARY (13B)
- 32 MARY DUKE BIDDLE MUSIC BUILDING (12A)
- 33 CABINET SHOP (12D)
- 34 HEATING PLANT (12D)
- 35 PAINT SHOP & STORAGE BUILDING (12D)
- 36 PURCHASING BUILDING (13D)
- 37 MATERIAL SERVICES WAREHOUSE (13E)
- 38 LUMBER STORAGE (13E)
- 39 STORAGE BUILDING (13E)
- 40 TRANSPORTATION OFFICES & SHOPS (13E)
- 41 EAST CAMPUS SUB STATION (12D)
- 70 EAST CAMPUS SERVICE FACILITY (12D)

*NOT SHOWN ON MAP

Bulletin of Duke University

(USPS 073-680)

Durham, NC 27706

bulletin of
Duke University 1985-86

Undergraduate Instruction



bulletin of
Duke University 1985-86

Undergraduate Instruction

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Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, call Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111. Duke University has adopted procedures for investigation and remedy of complaints involving discrimination. See the chapter "Campus Life and Activities."

The *Bulletin of Duke University*, Volume 57, includes the following titles: *The Fuqua School of Business*; *The School of Forestry and Environmental Studies*; *Marine Laboratory*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *The Graduate School* (short form); *Allied Health Programs*; *The School of Law*; and *Information and Regulations*.

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University Calendar—1985-86

Summer 1985*

March		
	25	Monday—Beginning of registration for Term I and/or Term II
April		
	30	Tuesday—Beginning this day, summer drop/adds must be approved by the academic dean or director of graduate studies
May		
	1	Wednesday—Last day for payment of Term I fees without \$25 late fee (before 4:30 P.M.)
	9	Thursday—Term I classes begin
	13	Monday—Drop/add for Term I ends at 4:00 P.M.
June		
	17	Monday—Last day for payment of Term II fees without \$25 late fee (before 4:30 P.M.)
	21	Friday—Term I final examinations begin
	22	Saturday—Term I final examinations end
	25	Tuesday—Term II classes begin
	27	Thursday—Drop/add for Term II ends at 4:00 P.M.
August		
	7	Wednesday—Term II final examinations begin
	8	Thursday—Term II final examinations end

Fall 1985

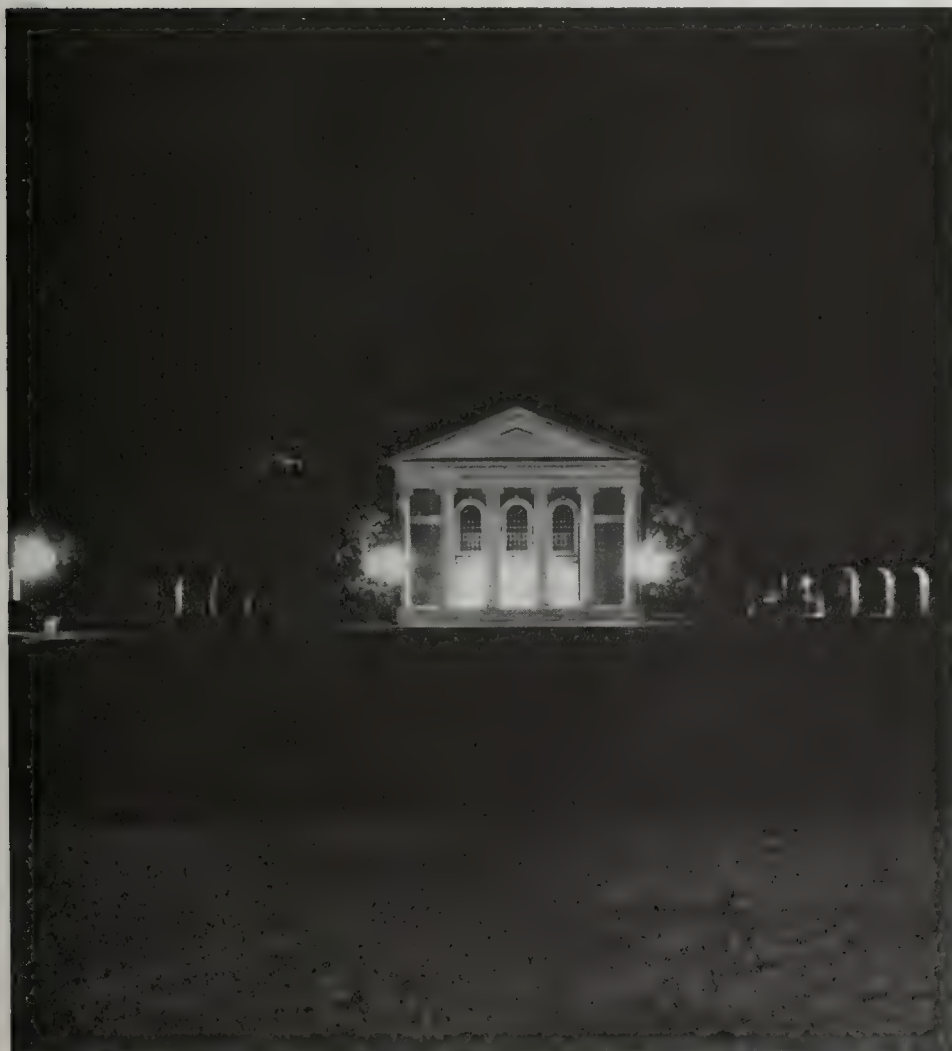
August		
	21	Wednesday—Orientation begins; assemblies for all new undergraduate students
	26	Monday, 8:00 A.M.—Fall semester classes begin
	27	Tuesday, 4:00-6:00 P.M.—Drop/add begins, Intramural Building
	28-30	Wednesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/add continues, 103 Allen Building
September		
	2	Monday—Labor Day, classes in session
	3-6	Tuesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/add continues, 103 Allen Building
October		
	11	Friday—Last day for reporting midsemester grades.
	11	Friday, 6:00 P.M.—Fall break begins
	16	Wednesday, 8:00 A.M.—Classes resume
November		
	4-7	Monday-Thursday—Registration for spring semester, 1986
	22	Friday, 6:00 P.M.—Thanksgiving recess begins
December		
	2	Monday, 8:00 A.M.—Classes resume
	6	Friday, 6:00 P.M.—Fall semester classes end
	7-9	Saturday-Monday—Reading period
	8	Sunday—Founders' Day
	10	Tuesday—Final examinations begin
	14	Saturday—Final examinations end

Spring 1986

January		
	3	Friday—Orientation begins
	7	Tuesday—Registration and matriculation of new undergraduate students
	8	Wednesday, 8:00 A.M.—Spring semester classes begin
	9	Thursday, 4:00-6:00 P.M.—Drop/add begins, Intramural Building

*The School of Forestry, the Fuqua School of Business, the Marine Laboratory, the Graduate Nursing Program, and Physical Therapy may have different starting dates during the summer; consult the appropriate bulletins and schedules.

- 10 Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/add continues, 103 Allen Building
- 13-17 Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/add continues, 103 Allen Building
- February**
- 14 Friday—Last day for reporting midsemester grades
- 28 Friday, 6:00 P.M.—Spring recess begins
- March**
- 10 Monday, 8:00 A.M.—Classes resume
- 24-26 Monday-Wednesday—Registration for fall semester, 1986 and beginning of registration for summer, 1986
- April**
- 18 Friday, 6:00 P.M.—Spring semester classes end
- 19-21 Saturday-Monday—Reading period
- 22 Tuesday—Final examinations begin
- 26 Saturday—Final examinations end
- May**
- 3 Saturday—Commencement begins
- 4 Sunday—Graduation exercises. Conferring of degrees



University Administration

GENERAL ADMINISTRATION

H. Keith H. Brodie, M.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
Eugene J. McDonald, LL.M., *Senior Vice-President for Administration*
William J. Griffith, A. B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Development and Alumni Affairs*
William L. Green, Jr., A.B., *Vice-President for University Relations*
Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
Roger L. Marshall, A.B., *Secretary of the University*
Andrew G. Wallace, M.D., *Vice-Chancellor for Health Affairs*
Joel L. Fleishman, LL.M., *Vice-Chancellor*
Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
R. James Henderson, M.Ed., *Associate Vice-President and Business Manager*

GENERAL ACADEMIC ADMINISTRATION

Phillip A. Griffiths, Ph.D., *Provost*
Craufurd Goodwin, Ph.D., *Vice-Provost for Research and Dean of the Graduate School*
Thomas A. Langford, Ph.D., *Vice-Provost for Academic Affairs*
Charles Clotfelter, Ph.D., *Vice-Provost for Academic Policy and Planning*
Clark R. Cahow, Ph.D., *Assistant Provost and University Registrar*
Richard Stubbing, M.B.A., *Assistant Provost for Academic Policy and Planning*
Calvin Ward, Ph.D., *Assistant Provost for Academic Facilities*

Trinity College, Arts and Sciences

Ernestine Friedl, Ph.D., *Dean*
Albert F. Eldridge, Ph.D., *Associate Dean*
Virginia S. Bryan, Ph.D., *Assistant Dean and Coordinator of Institutional Research and Special Projects*
Martina J. Bryant, Ed.D., *Assistant Dean*
Elizabeth S. Nathans, Ph.D., *Assistant Dean and Director of the Premajor Advising Center*
Mary Nijhout, Ph.D., *Assistant Dean and Director of Health Professions Advising*
Gerald L. Wilson, B.D., Ph.D., *Assistant Dean and Coordinator of the Deans' Staff*
Ellen W. Wittig, Ph.D., *Assistant Dean and Coordinator of Curriculum*
Thomas D. Mann, A.B., *Assistant Dean for Administration, Arts and Sciences, Trinity College*
Judith Ruderman, Ph.D., *Director of Continuing Education*
Brian Silver, Ph.D., *Assistant Dean and Adviser for Study Abroad*
Calvin Ward, Ph.D., *Director of the Summer Session*

School of Engineering

Earl H. Dowell, Sc.D., *Dean*
Marion L. Shepard, Ph.D., *Associate Dean*

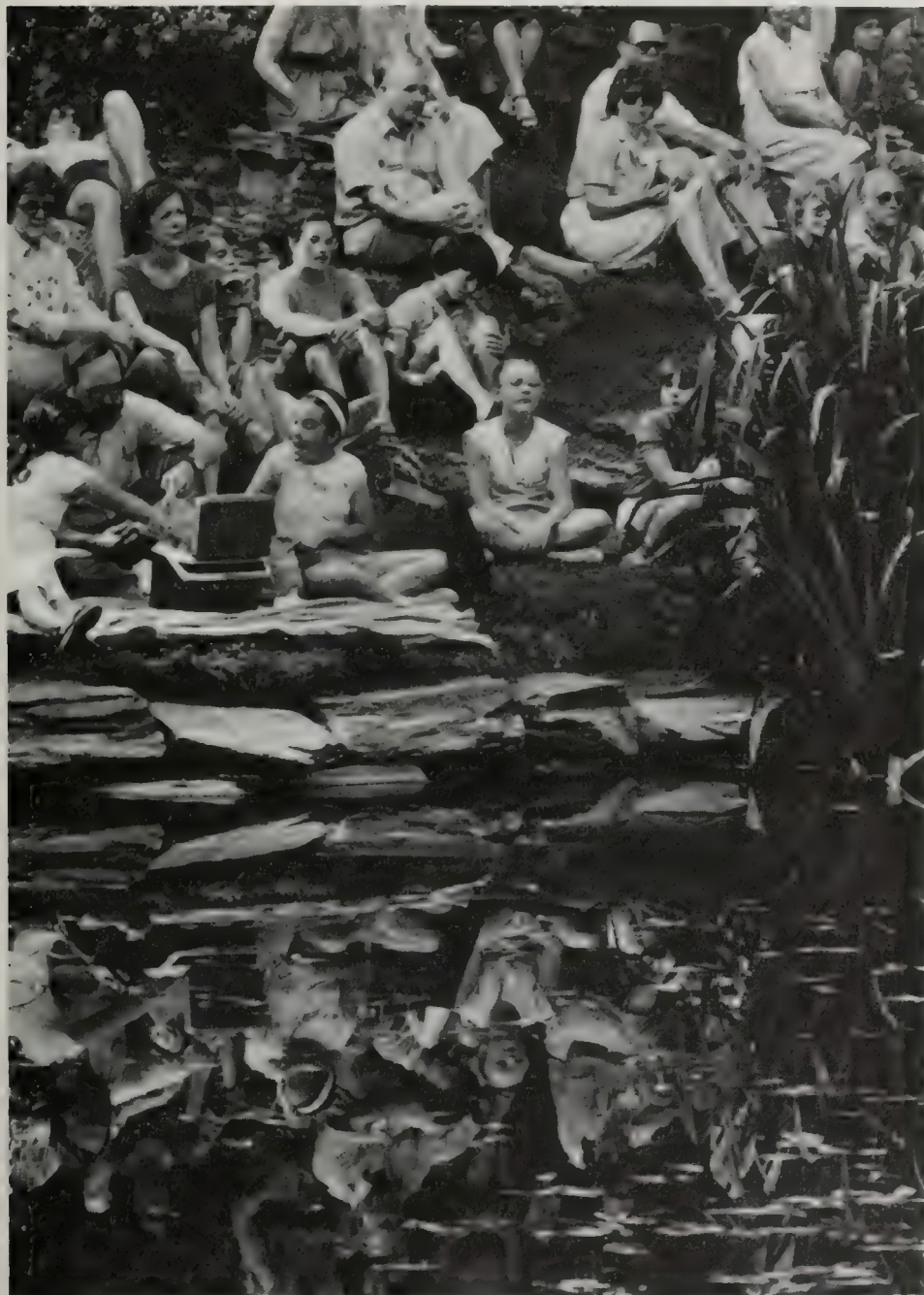
Student Affairs

William H. Willimon, M.Div., STD, *Minister to the University*
Nancy A. Ferree, M.Div., *Assistant Minister to the University*
Jane Clark Moorman, M.S.W., ACSW, *Director, Counseling and Psychological Services*
Susan L. Coon, M.A., *Director, Office of Cultural Affairs*
Brian Q. Silver, Ph.D., *Director, International House and International Adviser*
Caroline L. Lattimore, Ph.D., *Dean for Minority Affairs*
Edward S. Hill, Ph.D., *Director, Mary Lou Williams Center for Black Culture*
Patricia O'Connor, Ed.D., *Director, Placement Services*
Richard L. Cox, B.D., Ed.D., *Dean for Residential Life*
Ella E. Shore, M.A., *Associate Dean for Residential Life*
Homai McDowell, D.B.A., *Director, Office of Student Activities*
Barbara A. Morris, M.D., *Director of Student Health*
Suzanne Wasiolek, M.H.A., *Dean for Student Life*
Jake Phelps, B.A., *Director, University Union*
Peter J. Coyle, Jr., B.A., *Associate Director, University Union*

John A. Friedrich, Ph.D., *Chairman and Professor, Health, Physical Education, and Recreation*
Jane Lloyd, M.A., *Director of Sports Clubs*
Leroy C. Skinner, M.A., *Director of Intramural Athletics*

Admissions and Financial Aid

Jean A. Scott, Ph.D., *Director of Undergraduate Admissions*
James A. Belvin, Jr., A.B., *Director of Undergraduate Financial Aid*



General Information



Duke University

In 1839 a group of citizens from Randolph and adjacent counties in North Carolina assembled in a log schoolhouse to organize support for a local academy founded a few months earlier by Brantley York. Prompted, they said, by "no small share of philanthropy and patriotism," they espoused their belief that "ignorance and error are the banes not only of religious but also civil society which rear up an almost impregnable wall between man and happiness." The Union Institute, which they then founded, was reorganized in 1851 as Normal College to train teachers, and again in 1859 as Trinity College, a liberal arts college, which later moved from the fields of Randolph County to the growing city of Durham, North Carolina. Trinity College was selected by James B. Duke as the major recipient of a fortune when, in 1924, he provided endowment funds for the university that would be organized around Trinity College and named for the Duke family.

The old Trinity College had, like almost all institutions in America at the time it was founded, been restricted to men. In 1896, Washington Duke gave an endowment with the condition that women be admitted "on equal footing with men." Thereafter, women were educated in Trinity College, and in 1930 the Woman's College was established as a separate college. Trinity College and the Woman's College continued as coordinate colleges for over forty years. To assure that women were indeed admitted "on equal footing with men," and to recognize that the education which men and women had received at Duke had long taken place in the same classrooms, the University merged these coordinate colleges in 1972 to form Trinity College of Arts and Sciences, the liberal arts undergraduate college of the University. The Bachelor of Arts and Bachelor of Science degrees may be earned in the college.

Instruction in engineering started at Normal College in 1851 and was continued at Trinity College as an option in the arts and sciences program. A Department of Engineering was established at Trinity in 1910. Following the establishment of Duke University in 1924, the Departments of Civil and Electrical Engineering were formed in 1927, and a Department of Mechanical Engineering was added four years later. The three engineering departments were joined to form the Division of Engineering as a separate administrative unit of the University. In 1939 this division was renamed the College of Engineering, which in 1966 became a professional school of engineering. The Division of Biomedical Engineering was added to the School of Engineering in 1967, and it was recognized as a department in 1971. In 1974 the name of the mechanical engineering department was changed to the Department of Mechanical Engineering and Materials Science; in 1982, the Department of Civil Engineering was renamed the Department of Civil and Environmental Engineering. All four depart-

ments offer courses leading to Bachelor of Science in Engineering, Master of Science, and Doctor of Philosophy degrees.

The School of Nursing was established in 1931 in association with the School of Medicine and Duke Hospital. From 1944 until 1957, the Bachelor of Science in Nursing Education degree was offered in cooperation with the Department of Education. A four-year program leading to the degree of Bachelor of Science in Nursing was approved by the University Board of Trustees in 1953, and in 1958 a graduate program was initiated. In 1980 the University Board of Trustees approved the phaseout of the existing degree programs in the School of Nursing and established a task force to recommend future direction for the school. At present, the School of Nursing offers courses leading to the Master of Science in Nursing degree. The Dean of the School of Nursing reports to the Chancellor for Health Affairs.

As the University developed around the core of undergraduate colleges and schools, the Graduate School expanded in areas of instruction and research. The School of Law of Trinity College became the Duke University School of Law, and other professional schools were established. The Divinity School was organized in 1926, the School of Medicine in 1930, the School of Forestry in 1938, and the Graduate School of Business Administration in 1969. In 1974, the School of Forestry was renamed the School of Forestry and Environmental Studies; in 1980 the business school became the Fuqua School of Business.

Duke, a privately supported, church-related (Methodist) university, has over 9,000 students enrolled in degree programs. These students represent nearly every state and many foreign countries; Duke has more than 60,000 alumni in all fifty states and in many foreign countries. The University is a member of the North Carolina Association of Independent Colleges and Universities, the Southern Association of Colleges and Schools, and the Association of American Universities.

From academy to university, some of the basic principles have remained constant. The Duke University motto, *Eruditio et Religio*, reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students, the objective has been to encourage individuals to achieve, to the extent of their capacities, an understanding and appreciation of the world in which they live, their relationship to it, their opportunities, and their responsibilities.

Resources of the University

The Faculty. The University faculty, approximately 1,400 along with 1,700 adjunct and clinical faculty, maintains a tradition of personal attention to students and devotion to research. Many members of the faculty are, and have been, cited for excellence in teaching and are elected to membership in the national societies which honor those best in scholarship and research. Leaders in their disciplines and their professional organizations, they are authors of significant books and articles. Members of the faculty also act as consultants to industry, government, and foundations. To honor its outstanding faculty, the University has established more than thirty James B. Duke Professorships and other named professorships.

The Library System. The libraries of the University consist of the William R. Perkins Library and its seven branches on campus: Biology-Forestry, Chemistry, Divinity, East Campus, Engineering, Music, Mathematics-Physics; the Undergraduate Library; the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort; the Fuqua School of Business Library; the Law Library; and the Medical Center Library. In June 1983, these libraries contained approximately 3,300,000 volumes and ranked nineteenth in size among academic libraries in the United States. More than 10,000

periodicals, 11,000 serials, and 166 newspapers are received regularly. The collection includes about 7,450,000 manuscripts, 82,000 maps, 39,000 music scores, and 651,000 rolls or sheets of microtext.

The William R. Perkins Library. The William R. Perkins Library, the main library of the University, houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The newspaper collection, with nearly 50,000 reels of microfilm, has several long eighteenth-century files; strong holdings of nineteenth-century New England papers; and antebellum and Civil War papers from North Carolina, South Carolina, and Virginia; as well as many European and Latin American papers. The manuscript collection of approximately seven and a half million items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region; it also includes significant papers in English and American literature. The rare books collection contains many scarce and valuable materials covering a broad range of fields, and the Latin and Greek manuscripts constitute one of the outstanding collections of its kind in the United States. The collection of Confederate imprints is the largest in the country.

The Undergraduate Library houses the required reading materials placed on reserve for most graduate and undergraduate courses as well as the library's audiovisual collection of films, audio and disk recordings, and video cassettes. The branch libraries serve the academic disciplines whose names they bear. The East Campus Library is primarily for undergraduate use, but it also contains the principal collections for graduate and undergraduate study in art.

Reference librarians are on duty in Perkins Library for most of the hours the library is open. Their primary responsibility is to assist patrons in making the most effective use of library collections and facilities. In addition to answering specific questions, the reference librarians also help patrons access information by identifying and explaining the use of library sources and by giving formal and informal library instruction to groups of students, faculty, or staff. Professional reference service is available to students in all other campus libraries.

Tours of the Perkins Library are given frequently during Orientation Week and upon request throughout the year. Information about other campus libraries may be obtained from the staff in each of the libraries. Handbooks about library services and facilities are also available in each of the libraries.

To protect the collections of Perkins Library for the benefit of all members of the University community, an electronic security system is in operation at the main exit. Desk attendants are stationed at the library's principal exit and are authorized to examine all books and other library materials that people leaving the library may be carrying in hands, briefcases, or bags to determine if they are properly charged. Anyone who refuses to permit books to be examined may be denied further use of the library.

The library has microfilming and copying services. The rules with regard to copyright and a schedule of fees for reproduction services are available in the library at the point of service.

The Medical Center Library. The Medical Center Library, located in the Seeley G. Mudd Communications Center and Library Building, provides the services and collections necessary to further educational, research, and clinical activities in the medical field. Services are available to the students, faculty, and staff of the School of Medicine; of the Division of Allied Health; of Duke Hospital; and of the graduate departments in the basic medical sciences. Other students and faculty needing access to biomedical literature may apply for privileges upon application to the Chief of Readers' Services.

Over 205,000 volumes are available, including the Trent Collection in the History of Medicine. Approximately 2,650 journal subscriptions are received currently, in addition to extensive back files of older materials. The library has several types of audiovisual materials and equipment. With the exception of certain items shelved on reserve, these materials have been integrated into the general book and journal collections and are listed in the card or journal catalogs. The Frank Engel Memorial Collection consists of a small group of books on nonmedical subjects for general reading, together with several newspapers and popular magazines. Traditional reference services are supplemented by on-line bibliographic systems and computer-produced specialized indexes.

The uniform borrowing privileges apply to all registered users. Details of loan and other services may be found in the guide which is published each year and is available at the library.

The School of Law Library. The School of Law Library, with over 340,000 volumes, serves both the University and the local legal community. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. A large section of the library collection is devoted to treatises on all phases of law and legal sciences, as well as history, economics, government, and other social and behavioral sciences relevant to legal research. The treatises are organized in the Library of Congress classification system and are accessible through a public catalog. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. The library receives the records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, and the North Carolina Supreme Court and Court of Appeals. In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics. Undergraduate and graduate students whose course of study requires access to legal literature may use the library. However, access to the library may be restricted during certain times because of accreditation standards.

Record Library. The Department of Music has a record library separate from the university libraries with facilities for listening to records and tapes. All materials may be used in the listening room and any member of the community may borrow from the Arts Council Collection of more than 2,400 records for a nominal fee.

University Archives. The Duke University Archives, the official archival agency of the University, collects, preserves, and administers the records of the University having continuing administrative or historical value. The institutional archives, which also include published material, photographs, papers of student groups and faculty, and selected memorabilia, are available for research under controlled conditions in 341 Perkins Library.

Computation Center. Extensive computer resources are essential for a contemporary university. Computing is provided at Duke by the Duke University Computation Center (DUCC). The center presently maintains an IBM 3083 System Complex with eight megabytes of memory, eight IBM 3380 disk drives, eight IBM 3350 disk drives, four IBM 3330-11 disk drives, six IBM 3420 tape drives, three IBM high-speed

printers, one Xerox 8700 laser printer, a Cal-Comp digital plotter, and an IBM 2540 card reader/punch. The DUCC facility is connected by a high-speed microwave link to the Triangle Universities Computation Center (TUCC) located in the Research Triangle Park.

TUCC is a regional computer network formed and operated jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. The computer equipment at TUCC consists of one IBM 3081 with twenty-four million bytes of memory, one FPS-164 attached processed "super-computer," one IBM Model 168 with eight million bytes of memory, multiple 3330- and 3350-type disk facilities, thirteen tape drives, card readers, and printers. Also available is a small Hewlett-Packard 2000 access computer which provides BASIC interactive computing.

The IBM 3083 at DUCC is used mostly for administrative computing and as a high-speed link to TUCC. TUCC is used for academic, mainframe research, and instructional computing. Also connected to TUCC are four medium-speed printers located in the Engineering Building, the Biological Sciences Building, the Sociology-Psychology Building, and the West Duke Building on East Campus, as well as seven low-speed interactive terminal clusters located at various points on campus. Five clusters and two large laboratories of IBM Personal Computers are available at various locations around campus. The laboratories are housed in the Engineering Building and in North Building.

Funds for using TUCC may come from outside grants or contracts or from University funds. Several schools within the University such as Arts and Sciences and Engineering may apply for funding specifically earmarked for use at TUCC. Faculty within these schools are automatically given a TUCC account code. Graduate students in these schools may apply for a TUCC account code. Additional funds are normally available through departments. More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center.

Science Laboratories. In addition to the teaching and research laboratories in the departments of natural and social sciences and in the School of Engineering, there are other facilities in which some advanced undergraduates work on individual projects. These include the Duke University Marine Laboratory in Beaufort, North Carolina; the phytotron of the Southeastern Plant Environment Laboratories, located on the Duke campus; the Duke Forest, adjacent to the campus; the Duke University Primate Center in Duke Forest; and the Triangle Universities Nuclear Laboratory, also on the campus.

Duke as a Residential University

Duke has a long tradition as a residential university and has sought to provide for the great majority of the undergraduates convenient on-campus housing in both residence halls and apartments. While the University was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

Academic, cultural, and cocurricular programming is planned and presented throughout the year in the residence halls through the cooperative work of the Office of Residential Life, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are several faculty members in residence in both freshman and upperclass houses. Faculty offices and seminar rooms are also located in several of the freshman houses. The goals of these various programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside of the formal classroom, and to develop a greater

sense of community within the individual residence halls as well as within the greater University.

The Undergraduate College and School

In Trinity College of Arts and Sciences and the School of Engineering, instruction is offered by University faculty who engage in research and in graduate and undergraduate teaching. Duke offers its undergraduates the opportunity to study with many internationally recognized authorities in their disciplines and with faculty members who are jointly committed to undergraduate instruction and to the advancement of knowledge. The University recognizes that students learn not only through formal lectures, but also through the interplay of ideas among faculty members and students; thus, it offers undergraduates opportunities to test their ideas against those of their professors and to observe at close range those who have committed their lives to academic careers.

The University, if it is doing its job properly, is educating citizens of the United States and of the world, not only individuals aspiring to personal fulfillment. At Duke, the men and women who earn degrees are likely to become leaders in industry, government, and the professions. They will have influence on and will be influenced by the social fabric of which they are a part. The kind of people they become will matter not only to them and their families, but also to their communities, to the United States, and to the countries of the rest of the world as well.

Amidst changing external conditions, the University cannot be sure of what knowledge and what talents will best prepare the citizens of the future for the general welfare. The chances are that the currently most lucrative professions will not remain so as new combinations of knowledge and skill become more useful to the polity which supports us all.

Trinity College of Arts and Sciences. At Duke a liberal arts education provides the variety and therefore the flexibility which can best prepare students for rich personal lives and for their role as citizens in an uncertain future. At its most successful, a liberal arts education results in an understanding of the nature of knowledge as it is reinterpreted in each generation and of how new knowledge is produced, analyzed, and synthesized in mathematics and the natural sciences, in the arts and the humanities, and in the social and behavioral sciences. In all the arts and sciences, a liberal education teaches one to analyze data and how to discern patterns within the material. A liberal education conveys sufficient information discovered by each of the major types of disciplines to serve as a base from which a person can go on to acquire new learning as changing circumstances demand. Analytical and conceptual ability along with information also enables one, in the work and reasoning of others, to distinguish the true from the false, the elegant from the shoddy, and the well-reasoned from the flashy.

A liberal arts education provides perspectives: time perspective—the realization that the present moment is bounded by and to its relation to past and future history; space perspective—the realization that a presently inhabited spot is bounded by and to its relation to other places on the globe, and indeed, the universe; cultural perspective—the realization that our present way of life is only one of many viable possibilities and is bounded by and to the different cultures of other people in the world; and artistic perspective—the realization that contemporary forms and styles in the arts are bounded by and to their past, present, and future contexts.

The capstone on our ideal education is the mastery of one subject in a major field. It serves as a prototype of what advanced knowledge in one field of inquiry is like and of the sheer joy of intellectual exploration.

School of Engineering. The undergraduate engineering program at Duke University is designed both for students who intend to become professional engineers and for those who desire a modern, general education based on the problems and the promises of a technological society. The environment in which students are educated is as important in shaping their future as their classroom experiences. In the Duke School of Engineering this environment has two major components: one is modern technology derived from the research and design activities of faculty and students in the school; the other is the liberal arts environment of the total University, with its humanitarian, social, and scientific emphases.

Engineering is not a homogeneous discipline; it requires many special talents. Some faculty members in the School of Engineering are designers; they are problem-oriented, concerned with teaching students how to solve problems—how to synthesize relevant information and ideas and apply them in a creative, feasible design. Other engineering faculty members function more typically as scientists; they are method-oriented, using the techniques of their discipline in their teaching and research to investigate various natural and artificial phenomena.

Degree Programs



Degrees and Academic Credit

Duke University offers in Trinity College of Arts and Sciences the degrees of Bachelor of Arts and Bachelor of Science, and in the School of Engineering the degree of Bachelor of Science in Engineering. Within the curriculum of each college or school, students have the major responsibility for designing and maintaining a course program appropriate to their background and goals. They are assisted by faculty advisers, departmental Directors of Undergraduate Studies, and academic deans.

Credit toward a degree is earned in units called semester courses (s.c.), commonly abbreviated as courses. These courses ordinarily consist of three to four hours of instruction each week of the fall or spring semester or the equivalent total number of hours in a summer term. Double courses, half courses, and quarter courses are also recognized.

Trinity College of Arts and Sciences

A variety of approaches to a liberal arts education is provided by Program I and Program II. Either program leads to the Bachelor of Arts or Bachelor of Science degree and requires thirty-two semester courses. Students study in the following divisions of learning:

*Humanities.** Art, Asian and African languages (Arabic, Chinese, Hindi-Urdu, Japanese, Persian, and Swahili), classical studies (including Greek and Latin), comparative literature, dance, drama, English, Germanic languages and literature, Judaic studies, music, philosophy, religion, Romance languages (including French, Italian, Portuguese, and Spanish), and Slavic languages and literatures (including Russian and Polish).

Natural Sciences and Mathematics. Biology, botany, chemistry, computer science, genetics, geology, marine sciences, mathematics, physics, statistics, and zoology.

*Social Sciences.** Anthropology, economics, education, history, political science, psychology, public policy studies, and sociology.

*Afro-American studies; Canadian studies; comparative area studies; distinguished professor courses; film; interdisciplinary courses; linguistics; medieval and Renaissance studies; perspectives in Marxism and society; science, technology, and human values; and women's studies include courses in more than one division. Nondivisional courses in the military sciences and in health, physical education, and recreation are also offered. In addition, advanced students in Trinity College may select a limited number of courses from among certain courses offered by the professional schools at Duke University. These courses explore the interrelationships of major social, political, economic, cultural, and intellectual developments.

PROGRAM I

Program I provides for the experience and achievement that constitute a liberal education. The ability to organize ideas and to communicate them with clarity and precision is refined by completing the writing requirement and the requirements for discussion in small groups. Knowledge of a foreign language contributes to an understanding of the nature of language itself and to perspectives on other cultures. The distribution requirements ensure learning about the concepts and analytical methods in the humanities and the arts, the social sciences, and the natural sciences. Additionally, through a course in the history of civilization students acquire knowledge of the complexity of forces that influence cultures and societies, through a course in literature they learn of the conscious products of the human intellect, and through study in an empirical natural science they gain an understanding of nature and the methods whereby humanity has reached that understanding. Students must complete the requirements listed below and explained, where necessary, on the following pages.

Writing

One course in writing (page 19).

Foreign Language

Eligibility to enter the third semester of college language instruction by completing two semester courses in one language at Duke, or the equivalent (page 19).

Distribution of Courses

Students complete the requirements for a major (see pages 19, 21, 22) and in addition take approved courses in each of the following:

- In the history of civilization field: one course, if not included in the major (see pages 20, 21 for approved courses);
- In the literature field: one course, if not included in the major (see page 21 for approved courses);
- In the empirical natural science field: one course, if not included in the major (see page 21 for approved courses);

and in addition:

- In one division* outside that of the major: four semester courses, including two at the advanced level (see page 20 for excluded courses);
- In the other division* outside that of the major: two semester courses (see page 20 for excluded courses).

Small Group Learning Experiences

Courses taught for small groups (page 22), as follows:

- Before reaching junior status: at least *one* full semester course designated as a *seminar, tutorial, or independent study*; or a combination of two *preceptorials or discussion sections*.
- During the junior and senior years: at least *two* semester-course credits for *seminars, tutorials, independent study, or a thesis*.

Course Credits

Thirty-two semester-course credits (no more than two with a grade of D), including (page 22):

- At least sixteen at Duke (ordinarily including the senior year).

*For the subjects in each division of learning, see Page 17.

- *At least nineteen outside the major department.*
- *No more than seventeen total for a Bachelor of Arts major and no more than nineteen total for a Bachelor of Science major.*
- *At least twelve at the advanced level.*
- *No more than: one credit of physical education activity and dance activity (i.e., two half-credit activity courses), two credits for house courses (i.e., four half-credit house courses), six from a professional school (e.g., business, engineering, medicine), and four in military science.*

Quality of Work

All passing grades are expected, but see pages 24 and 25 for minimum continuation requirements.

Writing. Students are required to demonstrate ability to write effective English prose by completing a course in expository writing, ordinarily University Writing Course 4, 5, 6, or 7.

Foreign Language. This requirement to assure that students have some knowledge of a foreign culture may be met in any of the following ways: (1) by passing one of the following courses: Arabic 2; Chinese 2; French 2, 12, 181; German 2, 14, 181; Greek 2, 181S; Hindi-Urdu 2; Italian 2, 181; Japanese 2; Latin 2, 181S; Persian 2; Polish 12; Portuguese 181; Religion 116 (Hebrew); Russian 2; Spanish 2, 12, 14, 181; Swahili 2; Yiddish 181; (2) by presenting a College Board Advanced Placement Score of 4 or 5, or score of 3 validated by satisfactory completion of an advanced course; or (3) by achieving a score on a College Board Achievement Test or College Board Placement Test sufficient to permit enrollment at the intermediate level of foreign language instruction (see the chapter "Academic Procedures and Information").

Students whose native language is not English may meet the requirement by successful completion of a course in English composition. Transfer students may satisfy the requirement in any of the above ways or by having fulfilled the foreign language graduation requirement at another college or university prior to entering Duke. Students who have knowledge of a foreign language other than those for which College Board tests are available may request to be examined in that language by special arrangement after matriculation.

Distribution of Courses. Students achieve breadth and balance of intellectual experience by taking courses in each of the three divisions of learning (the humanities, natural sciences, and social sciences, see page 17) and by taking in addition an approved course in each of three selected fields (history of civilization, literature, and empirical natural sciences). Courses that satisfy these requirements consist of the essential subject matter and substance of the discipline. Courses that satisfy the requirements for small group learning experiences may be used also to satisfy these requirements. Courses taken on the pass/fail basis, however, do not satisfy these requirements unless offered only on the pass/fail basis.

Divisions of Learning. Students must complete a certain number of *nonskills* courses in each of the three divisions (see table below):

First Division. The division of the major is called the first division. Each student must complete requirements for a major in a single discipline or in an interdisciplinary program. Thereby the requirement for the first division will automatically be satisfied. See the sections on major below, in the chapter "Academic Procedures and Information," and also the section on the major following each department's course descriptions.

Second Division. Each student must pass at least four semester courses in a second division of the student's choice. At least two of the four courses must be at the 100 or 200 level.

Third Division. Each student must pass at least two semester courses in the remaining division.

COURSES THAT DO NOT SATISFY THE DIVISIONAL DISTRIBUTION REQUIREMENTS—Military Science Courses, Courses in the Professional Schools, Physical Education Courses, and also the Following Skills Courses:

Arabic	1, 2, 11, 12, 13, 14, 63, 64
Art	53, 54, 56
Chinese	1, 2, 63, 64
Dance	134 and activity courses
Drama	91, 122, 123, 125, 127
English	3, 12, 28S, 61S, 62S, 71, 72, 73S, 74, 101S
French	1-2, 12, 63, 74, 76, 181
German	1-2, 14, 63, 105, 181, 182
Greek	1-2, 181
Hindi-Urdu	1, 2, 63, 64
Italian	1-2, 63, 181
Japanese	1, 2, 63, 64
Latin	1-2, 181
Mathematics	9-10, 19
Music	applied music (except for tutorials)
Persian	1, 2, 63, 64
Polish	11, 12
Political Science	138, 236
Portuguese	181
Psychology	117
Religion	115-116, 139
Russian	1, 2, 63, 64
Sociology	132, 133
Spanish	1-2, 12, 14, 63, 76, 181
Swahili	1, 2, 63, 64
University Writing	4, 5, 6, 7
Yiddish	181
Zoology	49S, 196D

Fields of Knowledge. In addition to fulfilling the divisional requirements, students must pass one course from each of the following three lists:

COURSES THAT SATISFY THE REQUIREMENTS IN HISTORY OF CIVILIZATION, LITERATURE, AND EMPIRICAL NATURAL SCIENCE

I. History of Civilization*

Afro-American Studies	56, 145, 146
Anthropology	115, 120, 121, 122, 123, 124, 126, 127, 128, 130, 131, 133, 134, 147, 148, 168
Art	69, 70, 125, 131, 132, 133, 134, 140, 141, 142, 143, 147, 149, 151, 152, 161, 175, 179
Classical Studies	11, 11S, 12, 12S, 53, 54, 125, 126, 133, 134, 135, 137, 144, 155
Economics	132, 150, 184
French	136, 139
German	129, 130
History	21, 21S, 22, 22S, 23, 25, 26, 49S, 53, 54, 75, 76, 91, 91S, 92, 92S, 93S, 95, 96, 101G, 101K, 102G, 104, 105, 106, 107, 108, 111, 112, 113, 114, 115, 116, 117, 120, 121, 122, 123, 124S, 125, 126, 128, 129, 130, 131, 132, 133, 134, 135, 136, 139, 141, 142, 143, 144, 145, 146, 149, 150S, 151, 156, 157, 158, 160, 161, 162, 168S, 171, 173, 174, 183S, 184
Interdisciplinary Courses	101, 102, 103, 162, 163, 184
Music	119, 138
Philosophy	93, 94, 108, 117, 119, 120, 132
Political Science	115, 131, 136, 151, 161, 163, 184, 187
Religion	51, 56, 57, 109, 124, 125, 133, 160, 161, 162, 163

*These courses explore the interrelationships of major social, political, economic, cultural, and intellectual developments.

Sociology 111, 138, 170, 180, 184

II. Literature

Afro-American Studies	173, 174
Arabic	171
Chinese	135, 136, 141
Classical Studies	63, 64, 119
Comparative Literature	100, 120, 121, 124, 125, 131, 132, 135, 139, 145, 150, 159, 160, 169, 170, 180
Distinguished Professor Courses	201, 203, 205
Drama	64, 141, 142, 143, 144, 145, 146, 148, 152, 154S, 162S, 163, 165
English	20, 21S, 22S, 23S, 24S, 25S, 26S, 49S, 51, 52, 91, 93, 121, 122, 123, 124, 125, 126, 127, 128, 131, 133, 135, 136, 137, 138, 139S, 141, 143, 144, 145, 151, 152, 153, 154, 155, 161, 162, 163, 164, 165, 167, 168, 169S, 171, 173, 175, 179S, 182, 183, 184, 186, 187, 221, 225, 235, 241, 245, 251, 263, 267, 275
French	101, 102, 103S, 104S, 141S, 142S, 145S, 146S, 147, 148, 151, 152, 153, 155, 156, 158, 162S, 163, 166S, 167S, 170, 248, 251, 252, 255, 256, 257, 258, 261, 263, 265, 266, 290S
German	101, 103S, 104S, 109S, 115S, 125, 126S, 127S, 131, 132, 172, 173, 201S, 202S, 205, 206, 207S, 209S, 211S, 214S, 215S, 217S, 230S
Greek	103S, 104S, 203, 205, 206, 209, 210, 221, 222
Italian	183, 184, 283, 284, 285
Japanese	155, 156, 161
Latin	63, 64, 103S, 104S, 105S, 112S, 117, 151S, 153S, 201, 203, 204, 210, 221
Philosophy	108
Polish	174
Political Science	174
Portuguese	182
Religion	50, 52, 55, 106, 108, 128, 147, 172, 188, 233, 287
Slavic Languages and Literatures	124, 161, 162, 175, 176, 177, 183
Spanish	101, 102, 103S, 104S, 105, 106, 107S, 108S, 121, 123S, 141S, 142S, 146, 151, 153, 157, 162, 163, 165S, 166, 171, 245, 246, 253, 254, 258S, 275, 276, 277
Yiddish	171

III. Empirical Natural Science

Any course offered by the natural science departments (botany, chemistry, geology, physics, zoology) which carries one semester-course credit or more satisfies this requirement.

Major. Students are expected to acquire some mastery of a particular discipline or interdisciplinary area as well as to achieve a breadth of intellectual experience. They therefore complete a departmental major, an interdisciplinary major, or an interdepartmental concentration. At least half the courses for a student's major field must be taken at Duke although departments may make exceptions to this rule in special circumstances. A student who completes requirements for two majors may have both recorded on the official record. See the chapter "Academic Procedures and Information" for the majors within each degree and for procedures on declaring a major.

Departmental Major. The courses for a departmental major may include introductory or basic prerequisite courses and higher-level courses in the major department or in the major department and related departments. The courses required in the major department must include at least five beyond the introductory or basic prerequisite level, but may not exceed eight semester course credits for the Bachelor of Arts degree or ten for the Bachelor of Science degree. Students may elect a more intensive major program, but only thirteen courses in one department count toward the graduation requirement of thirty-two semester courses. Furthermore, the total number of courses at any level in the major and in related departments may not exceed seventeen semester courses for the Bachelor of Arts degree and nineteen semester courses for the Bachelor of Science degree. The courses required for a major are specified by the department. The requirements appear in the section following each department's course descriptions.

Interdisciplinary Major. Students may satisfy the requirement by completing work prescribed for a major in an approved program. These programs include Afro-American studies, biology, Canadian studies, comparative area studies, comparative literature, drama, and medieval and Renaissance studies. The requirements for an interdisciplinary major appear under each program in the chapter "Courses of Instruction."

Interdepartmental Concentration. A student may pursue an interdepartmental major program designed by the student and advisers as an alternate means of satisfying the major requirement. An interdepartmental concentration consists of at least three courses beyond the introductory level in each of two or more departments. For procedures see the section on declaration of major or division in the chapter "Academic Procedures and Information."

Small Group Learning Experiences. By supplementing the classroom and lecture methods of instruction, small group learning experience courses assure students opportunities to engage in discussion, develop skills, refine judgment, and defend ideas when challenged. A *seminar* (ordinarily indicated by the suffix S) is an independent course of twelve to fifteen (exceptionally to twenty) students who, together with an instructor, engage in disciplined discussion. The number of meeting hours per term is the same as for regular courses of equivalent credit. Instructors are encouraged to present to each student at the end of the term a written evaluation of the student's work. A *discussion section* (D) is a group of approximately ten students and an instructor, in which discussion is the paramount characteristic; it is an integral part of a larger regular course, and every member of the class is enrolled. A *preceptorial* (P) is a group of usually no more than twelve students and an instructor in which discussion is the primary component; it is an additional and optional unit attached to a regular course involving one or more extra meetings per week. No additional course credit is given for a preceptorial. A *tutorial* (T) is a group of one to five students and an instructor meeting for discussion which is independent of any other course. For *independent study* students pursue their own interests in reading, research, or writing, but meet with an instructor for guidance and discussion. See the section on independent study in the chapter "Academic Procedures and Information." Instructors in all courses that satisfy the requirements for small group learning experiences, including independent study, must meet with the students at least once every two weeks. The requirements for small group learning experiences are listed under Program I, above.

Course Requirements. Thirty-two semester courses are required for graduation, including a maximum of two courses passed with a grade of D. At least sixteen courses, including the work of the senior year, must be passed at Duke. Twelve courses must be at the advanced (100-200) level. The thirty-two course credits may include (1) no more than thirteen courses in one department; (2) no more than seventeen total for a major under the Bachelor of Arts degree and no more than nineteen total for a major under the Bachelor of Science degree; (3) no more than one semester-course credit in physical education activity and dance activity (i.e., a total of two half-credit activity courses); (4) no more than two credits for house courses; (5) no more than six credits for courses taken in professional schools; and (6) no more than four semester-course credits in military science. Military science courses are normally taken in the junior and senior years. Additional courses, although not counted toward graduation, do appear on a student's permanent academic record. Military science courses, like professional school and all physical education courses, do not satisfy distribution or fields of knowledge requirements.

Residence. A residence period of eight semesters is the typical amount of time a student may take to earn either the Bachelor of Arts or the Bachelor of Science degree. This period may be extended for one or two semesters by a student's academic



dean for legitimate reasons, if it seems probable that an extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted residence of more than ten semesters in order to be graduated.

For the minimum residence period, at least sixteen courses must be satisfactorily completed at Duke, including the courses needed to meet the senior year residence requirement. (For the purposes of the residence requirement, advanced placement credits are *not* considered as courses taken at Duke.) If only sixteen courses are taken at Duke, they must include the student's last eight courses. A student with more than sixteen courses at Duke may take two of the last eight courses at another approved institution. A student who has completed twenty-four courses at Duke may take four of the last eight courses at another approved institution. Courses taken elsewhere must be approved in advance by the appropriate Director of Undergraduate Studies and the student's academic dean.

Former students of Trinity College or the Woman's College who have been out of college for at least six years may, with certain provisos, take up to eight semester courses in another institution of approved standing in final fulfillment of graduation requirements. Further information can be obtained from the Associate Dean of Trinity College of Arts and Sciences.

Quality of Work (Continuation Requirements). A student must achieve a satisfactory record of academic performance each term and make satisfactory progress toward graduation each year to continue enrollment in college. A student who fails to meet the minimum requirements described below must leave college for at least two semesters; a summer session may be counted as a semester. The student may apply to the Associate Dean of Trinity College of Arts and Sciences for readmission. If, after readmission, the student again fails to meet continuation requirements, the student will be ineligible, except in extraordinary instances, for readmission to Trinity College.

Satisfactory Performance Each Term. A student who does not receive a passing grade in all courses must meet the following minimum requirements or be withdrawn from the college.

In the Fall or Spring Semester: (1) in the first semester of enrollment at Duke, a student with a normal course load (of at least four semester courses, as defined in the chapter "Academic Procedures and Information") may not fail more than two courses; (2) after the first semester at Duke, a student with four or more courses may not fail more than one course; (3) a first-semester student, whether a freshman or a transfer student, who for a special reason has received permission from an academic dean to enroll in fewer than four courses may not fail more than one course; (4) a student taking an authorized underload after the first semester at Duke must earn all passing grades. (Students may not carry an underload without the permission of their academic dean.) For the purposes of continuation, incomplete work in any course is considered a failure to achieve satisfactory performance in that course. Therefore, where continuation is in question, incomplete work in any course must be completed with a passing grade in time for final grades to be submitted to the Office of the Registrar no later than the weekday preceding the first day of classes of the spring semester, or prior to the first day of classes of the second term of the summer session, as appropriate. In the case of incomplete work in the spring semester, this requirement applies whether or not the student plans to attend one or more terms of the summer session. The student, however, may not enroll in a summer term at Duke unless the requirement of satisfactory performance each semester has been satisfied.

In the Summer Session: to maintain enrollment at Duke a student may not fail more than one course in a summer term or a summer session; moreover, a student may not have a failing grade in addition to an incomplete grade in the preceding

spring. For purposes of continuation, incomplete work is considered failure to achieve a satisfactory performance in that course. Therefore, when eligibility to continue from the summer session to the fall is in question, incomplete courses must be satisfactorily completed in time for a passing grade to be submitted to the Office of the Registrar no later than the weekday preceding the first day of fall classes. (No student may enter the fall semester with any combination of *F* or *I* grades from the preceding spring and summer.)

Any student excluded from the college under the provisions of these regulations may on request have the case reviewed by the Associate Dean of Trinity College of Arts and Sciences.

Satisfactory Progress toward Graduation. Each year prior to the beginning of fall term classes, a student must have made satisfactory progress toward fulfillment of curricular requirements to be eligible to continue in the college; i.e., a certain number of courses must have been passed *at Duke* according to the following schedule:

<i>To be eligible to continue to the:</i>	<i>A student must have passed at Duke:</i>
3rd semester	6 semester courses
4th semester	10 semester courses
5th semester	14 semester courses
6th semester	18 semester courses
7th semester	22 semester courses
8th semester	26 semester courses

Courses in the arts and sciences taken in the summer terms *at Duke* may be used to meet this requirement; advanced placement may *not* be used to satisfy it. No more than two courses completed with *D* grades may be counted toward fulfilling this annual continuation requirement.

PROGRAM II

Nature and Purpose. Program II is an alternate approach leading to either the Bachelor of Arts or the Bachelor of Science degree which offers the student who has an unusual interest or talent in a single field, or an unusual combination of interests or talents in several fields, an opportunity to plan and carry out a special curriculum adapted to these interests and needs. The student, with the assistance of a departmental Program II adviser, designs an individual plan of study for the whole or the remainder of the student's college career. Together, they assess the student's background, needs, and ambitions and evaluate the resources at the University or outside it as means of satisfying those ambitions. They consider what academic courses would be useful and also take into account that a term of independent study or work/study on or off campus, or a period of study abroad, might be appropriate. Each curriculum is tailored to the special interests and talents of the student for whom it is designed. Among the many topics for Program II have been American studies, primatology, dramatic literacy, linguistics, biochemistry, mariculture, behavioral science, environmental policy, modern thought, and mass communications.

Admission. Students interested in Program II should confer with the Directors of Undergraduate Studies in the departments closest to their interests, with the dean responsible for Program II, and with the Chairman of the Committee on Program II, whose name may be obtained from 110 Allen Building. If the student seems eligible for Program II, the Director or other departmental adviser, or an interdepartmental committee, will counsel the student concerning the design of the curriculum. When an interdepartmental committee is needed, one department will bear administrative responsibility. The curriculum must be approved by the department and also by the Committee on Program II of the Undergraduate Faculty Council of Arts and Sciences. Upon endorsement by that committee, the program becomes an obligation assumed by the student although it may be modified later with the approval of the department

and the Committee on Program II. A description of the plan is sent to the academic dean responsible for Program II, and each semester the student's progress in achieving the plan is reviewed.

Until formally accepted into Program II, a student should register for courses to satisfy the curricular requirements of Program I. Upon acceptance into Program II, a student is relieved of most, but not all, requirements expected of Program I students. Should Program II be dropped for any reason, the student assumes all requirements of Program I. Ordinarily, students will be accepted into Program II only after their first semester at Duke; they are ineligible to apply for admission to Program II after their junior year. Further information about Program II may be obtained from the office of the academic dean responsible for Program II, in 110 Allen Building.

General Requirements. Apart from the requirements arising from the approved plan of work, a Program II student must satisfy certain general requirements: thirty-two semester-course credits for graduation; the regulations on military science courses; and residence, although the requirements relating to the last eight courses may be adjusted to suit the student's approved plan of work. Graduation with distinction is available for qualified students in Program II. See the section on honors in the chapter "Academic Procedures and Information."

UNDERGRADUATE-PROFESSIONAL COMBINATION PROGRAMS

A student who successfully completes twenty-four semester courses and all other degree requirements in Trinity College of Arts and Sciences, except for eight elective courses, may apply to transfer to a Duke professional school (medicine, law, business, or forestry and environmental studies). The appropriate approval from Trinity College and admission to the professional school are required. The baccalaureate degree will be awarded the student upon successful completion of the work in the first year in the professional school. The undergraduate record notes the student's enrollment in the combination program and the name of the professional school, the date of graduation from Trinity College, and the degree awarded, but it does not include courses taken in the professional school. Counseling and additional information are available from the preprofessional advisers.

PREPARATION FOR GRADUATE AND PROFESSIONAL SCHOOLS

Students planning to enter a graduate or professional school should consult their academic deans and faculty advisers at the earliest opportunity. Since many graduate and professional schools require special tests for students seeking admission, information regarding requirements should also be obtained from the catalogs of the appropriate schools. The Office of Counseling and Psychological Services will provide applications for the testing programs.

Graduate Schools of Arts and Sciences. As soon as practicable, students should ascertain the requirements of the graduate schools which they are considering and should consult an adviser in the field of the proposed advanced study. Most graduate schools have requirements in foreign languages, and candidates for the degree of Doctor of Philosophy may be required to pass reading examinations, usually in German and French.

Graduate Schools of Engineering. Students interested in graduate work in engineering should consult the Dean of the School of Engineering or the Director of Graduate Studies in one of the engineering departments. Most engineering graduate schools require that a candidate have the equivalent of a Bachelor of Science in Engineering degree; however, students in the natural and social sciences may obtain conditional admission if they have a sufficient background in mathematics.

Graduate Schools of Business Administration. Students seeking advice concerning preparation for graduate school in business administration may consult the adviser for graduate business programs in Trinity College. Many graduate programs in business administration are designed specifically for students with little or no undergraduate work in business. In general, a student should seek a good liberal arts background, which will help develop communication skills, analytical skills, and an understanding of human nature. Students have often chosen such courses as Computer Science 51, Economics 1 and 2 (or 51 and 52), Management Sciences 53, or Mathematics 31 as those which develop analytical skills. For further information concerning undergraduate preparation see the *Duke Prebusiness Handbook* or the *Official Guide to MBA Programs, Admissions, and Careers* book published by the Graduate Management Admission Council; these publications and other resource materials are available in the office of the prebusiness adviser in the college.

Medical and Dental Schools. Students planning to enter schools of medicine, dentistry, or veterinary medicine can prepare for admission by completing any of the regular departmental majors in Program I or by completing Program II, and by taking those courses required by the professional schools of their choice. Virtually all medical schools and most schools of dentistry and veterinary medicine require the same basic group of college premedical courses—a year of biology, a year each of inorganic and organic chemistry, and a year of general physics. In addition, many schools require a year of English and courses in the humanities or social sciences. About a third of all medical schools now require a year of calculus and some suggest courses in statistics. For a complete listing of these and other requirements set by each medical school, see *Medical School Admission Requirements*, published annually by the Association of American Medical Colleges. Current copies, as well as information concerning careers in dentistry, veterinary medicine, osteopathic medicine, and many allied health professions, are available in the Office of the Adviser for the Health Professions. Students should discuss their programs of study with their major advisers, academic deans, and with the adviser for the health professions.

Law Schools. Students who plan to prepare for law school should seek diversity in their undergraduate course programs and specialize in one or more areas. They may choose virtually any field for their major work. Although no specific courses are required, prelaw students have often chosen from the following courses: Management Sciences 53; Economics 51, 52; English 91; History 21, 22, 91, 92, 105, 106; Philosophy 41, 48; Political Science 91; Public Policy Studies 55; Sociology 10D.

For a fuller discussion of undergraduate preparation for the study of law, students should refer to the *Duke Prelaw Handbook* or the *Prelaw Handbook* published by the Association of American Law Schools and the Law School Admission Council, or consult with the prelaw adviser in the college.

Theological Schools and Religious Work. Students contemplating theological study should correspond at the earliest opportunity with the appropriate schools and with the authorities of their churches to learn how to prepare for the specific programs they expect to enter. Probably, they will find that they should consider the following subjects: English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; psychology, sociology, and anthropology; the fine arts and music; biblical and modern languages; religion, both in the Judaeo-Christian and in the Near and Far Eastern traditions. Some seminaries require Greek or Hebrew for admission. It is the understanding gained in these fields rather than the total number of credits or semester hours earned which is significant. More detailed information about theological education, not

limited to Duke, may be obtained from the Director of Admissions of the Divinity School.

The School of Engineering

Duke University offers in the School of Engineering programs of study which lead to the degree of Bachelor of Science in Engineering. Four programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET). These programs are biomedical engineering, civil engineering, electrical engineering, and mechanical engineering. These accredited programs, and special programs of study in interdisciplinary fields, are offered by the Departments of Biomedical Engineering, Civil and Environmental Engineering, Electrical Engineering, and Mechanical Engineering and Materials Science.

For graduation with a Bachelor of Science in Engineering degree, a student must complete successfully a minimum of thirty-two semester courses. These thirty-two semester courses must include the following:

General Requirements*

Writing	1 s.c.	This requirement is met by completing a University Writing Course.
Mathematics	4 s.c.	This requirement is met by completing Mathematics 31†, 32†, and 103; plus 104 or 111 or 135.
Natural Science.....	4 s.c.	This requirement is met by completing Chemistry 11, Physics 51 and 52, and an elective course in one of the natural science departments which presents fundamental knowledge about nature and its phenomena, preferably including quantitative expression.‡
Social Sciences and Humanities	4 s.c.	This requirement is met by completion of four courses from at least two departments, one in the humanities and one in social sciences. This program of courses should reflect a rationale or fulfill an objective appropriate to the engineering profession. Courses selected must be those which present essential subject matter and substance of the discipline; for example, no introductory skill courses may be used to satisfy this requirement. Likewise, courses devoted primarily to subjects such as accounting, management science, industrial management, finance, personnel administration, introductory language, and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum. House courses and courses taught in professional schools may not be used to satisfy this requirement.
Engineering and Applied Sciences.....	4 s.c.	This requirement is met by completion of at least one course from each of four of the following six areas: electrical science, information and computer science, mechanics (solid and fluid), materials science, systems analysis, and thermal science and transfer processes. See departmental requirements, which follow, for any specific courses to be included.
Digital Computation.....		Students are expected to have acquired digital-computer programming capability before their sophomore year. The programming capability may be satisfied by prior experience or by passing Engineering 51 or Computer Science 51.

*House courses cannot be used to meet Bachelor of Science in Engineering degree requirements.

†Mathematics 33 and 34 are acceptable in lieu of Mathematics 31 and 32.

‡Courses in mathematics, statistics, and computer science will not meet this requirement.

Departmental Requirements

Departmental

Specifications 15 s.c.

The department administering the major field of study will specify this requirement. In general, it will consist of both required courses and electives to be planned in consultation with the departmental adviser. In addition to the 4 s.c. in engineering and applied sciences listed under general requirements, departmental requirements include the equivalent of 4 s.c. in engineering science and 4 s.c. in engineering design. See the individual departmental requirements, which follow.

§Total Minimum

Requirement 32 s.c.

§A maximum of two semester courses of junior or senior level air science, military science, or naval science course work may be counted in satisfying the minimum requirements of thirty-two semester courses for a baccalaureate degree in engineering. These courses must be included in the fifteen semester courses listed under departmental requirements. All other courses completed in air, military, or naval science are taken in addition to the minimum program.

Biomedical Engineering Departmental Requirements

All general requirements and departmental requirements comprising the accredited biomedical engineering major are incorporated in the following sequence, only one of several possible sequences. The student is encouraged to choose electives and select a sequence which develops broad intellectual interests.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11	1	Chemistry 12	1
University Writing Course	1	Physics 51	1
Mathematics 31	1	Mathematics 32	1
Engineering 51 or Social Science or Humanities		Social Science or Humanities Elective or	
Elective	<u>1</u>	Engineering 51	<u>1</u>
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Physics 52	1	Biomedical Engineering 163	1
Electrical Engineering 61	1	Elective	1
Mathematics 103	1	Mathematics 111	1
Elective	<u>1</u>	Social Science or Humanities Elective	<u>1</u>
	4		4

Junior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering 110	1	Biomedical Engineering Elective	1
Biomedical Engineering 101	1	Life Science Elective	1
Engineering 135 or Mechanical Engineering		Biomedical Engineering 164	1
126 or Biomedical Engineering 202	1	Electrical Engineering 132 or Biomedical	
Biomedical Engineering 171	<u>1</u>	Engineering 132	<u>1</u>
	4		4

Senior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering Elective	1	Biomedical Engineering Elective	1
Life Science Elective	1	Elective	1
Social Science or Humanities Elective.....	1	Social Science or Humanities Elective.....	1
Elective	<u>1</u>	Elective	<u>1</u>
	4		4

Premedical students should schedule Chemistry 151, 152, and two life science electives before the end of their junior year by deferring some required courses to the senior year. Biomedical engineering electives include all courses with biomedical engineering numbers other than required courses. Engineering 83 is also counted as a biomedical engineering elective.

Civil and Environmental Engineering Departmental Requirements

The general requirements and departmental requirements comprising the accredited civil engineering major are all incorporated in the following typical program.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11.....	1	Engineering 24	1
Mathematics 31.....	1	Mathematics 32.....	1
University Writing Course.....	1	Physics 51	1
Engineering 51 or		*Approved Elective or	
Social Science - Humanities Elective.....	<u>1</u>	Engineering 51	<u>1</u>
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Engineering 75	1	Civil Engineering 16.....	½
Mathematics 103.....	1	Engineering 11	½
Physics 52	1	Engineering 123	1
*Approved Elective.....	<u>1</u>	Mathematics 111.....	1
	4	*Approved Elective.....	<u>1</u>
			4

Junior Year

First Semester	Courses	Second Semester	Courses
Civil Engineering 122.....	1	Civil Engineering 116.....	1
Civil Engineering 131.....	1	Civil Engineering 123	1
Engineering 83	1	Civil Engineering 133.....	1
*Approved Elective.....	<u>1</u>	*Approved Elective.....	<u>1</u>
	4		4

Senior Year

First Semester	Courses	Second Semester	Courses
Civil Engineering 134.....	1	Civil Engineering Design Elective.....	1
Civil Engineering 139.....	1	*Approved Elective.....	1
*Approved Elective.....	1	*Approved Elective.....	1
*Approved Elective.....	<u>1</u>	*Approved Elective.....	<u>1</u>
	4		4

*Part of a program of ten general electives planned with the adviser's approval to suit the interests and abilities of the individual student. In addition to satisfying the social science-humanities and natural science requirements of the School of Engineering, a minimum of one engineering and applied science course must be elected from the following: Engineering 101, Engineering 151, or Electrical Engineering 61. (If credit has not been received for Engineering 51 then two of the three courses must be elected.) The program should also include a minimum of two *emphasis electives* which, together with the civil engineering design elective, serve to reinforce the student's major area of study.

Electrical Engineering Departmental Requirements

The general requirements and departmental requirements comprising the accredited electrical engineering major are all incorporated in the following program. This program is presented as a guide to assist students in planning their four-year program and should not be viewed as an inflexible sequencing of courses.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31.....	1	Mathematics 32.....	1
Chemistry 11.....	1	Physics 51.....	1
University Writing Course.....	1	Approved Elective.....	1
*Engineering 51 or Computer Science 51 or Social Science - Humanities Elective.....	<u>1</u>	Engineering 51 or Computer Science 51 or Social Science - Humanities Elective.....	<u>1</u>
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Electrical Engineering 61.....	1	Electrical Engineering 62.....	1
Mathematics 103.....	1	Electrical Engineering 112.....	1
Physics 52.....	1	Mathematics 104, 111, or 135.....	1
Social Science-Humanities (Elective).....	<u>1</u>	Social Science-Humanities (Elective).....	<u>1</u>
	4		4

Junior Year

First Semester	Courses	Second Semester	Courses
†Electrical Engineering.....	1	†Electrical Engineering.....	1
†Electrical Engineering.....	1	†Electrical Engineering.....	1
‡Mathematics.....	1	§Natural Science.....	1
Social Science-Humanities (Elective).....	<u>1</u>	Approved Elective.....	<u>1</u>
	4		4

Senior Year

First Semester	Courses	Second Semester	Courses
Approved Electrical Engineering Elective.....	1	Approved Electrical Engineering Elective.....	1
Approved Elective.....	1	Approved Elective.....	1
Approved Elective.....	1	Approved Elective.....	1
Approved Elective.....	<u>1</u>	Approved Elective.....	<u>1</u>
	4		4

*May be replaced by an approved elective if the student has previously acquired competence in computer programming.

†These four courses must be chosen from the following: Electrical Engineering 103, 143, 157, 161, 186, 199.

‡Any 100-level math course except 123, 128, or 183.

§One of the following: Chemistry 12; Physics 105, 161, 176S, 181, and 185; Biology 14 are recommended.

Note: The selection of approved electives should take into account a departmental requirement that a student must have accumulated by graduation time the equivalent of *four* (4) engineering design and *eight* (8) engineering science courses.

In order to satisfy the School of Engineering distributional requirement of four courses in engineering and applied science, the student may use Electrical Engineering 61 as an electrical science course and Electrical Engineering 112 as a systems analysis course. The remaining two courses may be selected from any two of the following areas: information and computer science (Engineering 51 or Computer Science 51 may be used to satisfy this requirement), mechanics, materials science, and thermal sciences.

An up-to-date list of acceptable *engineering design* and *engineering science* courses may be secured through the departmental office.

Mechanical Engineering and Materials Science Departmental Requirements

The general requirements and departmental requirements comprising the accredited mechanical engineering major are all incorporated in the following typical program.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31	1	Mathematics 32	1
Chemistry 11	1	Physics 51	1
University Writing Course	1	*Engineering 83	1
Engineering 51 or		†Approved Elective or	
Social Science - Humanities Elective	1	Engineering 51	1
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Mathematics 103	1	Mathematics 111	1
Physics 52	1	Engineering 123	1
*Engineering 75	1	*Engineering 130† or 101§	1
†Approved Elective	1	†Approved Elective	1
	4		4

Junior Year

First Semester	Courses	Second Semester	Courses
*Engineering 101† or 130§	1	Mechanical Engineering 115† or 140§	1
Mechanical Engineering 140† or 115§	1	Mechanical Engineering 141† or 150§	1
†Approved Elective†		Mechanical Engineering 126†	
or Mechanical Engineering 126§	1	or Approved Elective†	1
†Approved Elective	1	†Approved Elective	1
	4		4

Senior Year

First Semester	Courses	Second Semester	Courses
Mechanical Engineering 150† or 141§	1	#Advanced Technical Elective	1
#Advanced Technical Elective	1	#Advanced Technical Elective	1
#Advanced Technical Elective	1	†Approved Elective	1
†Approved Elective	1	†Approved Elective	1
	4		4

*The four courses in engineering science must be Engineering 75, 83, 101, and 130.

†Part of a program of approved elective courses planned with the student's faculty adviser to suit individual interests and abilities. The program must include a minimum of five social science-humanities courses and one natural science course.

‡Designates sequence A, part of a program of core courses in mechanical engineering which should be taken in this designated sequence or the one which follows.

§Designates sequence B, part of a program of core courses in mechanical engineering which should be taken in this designated sequence or the one preceding.

#Part of a program of four advanced courses chosen to emphasize a professional objective, two of which must be in mechanical engineering. A current list of courses satisfying this requirement is maintained by faculty advisers.

The major requirements are included in the minimum total of thirty-two courses listed under general requirements and departmental requirements. Specific courses which must be included are Engineering 75, 83, 101, 123, and 130; Mechanical Engineering 115, 126, 140, 141, and 150.

Declaration of Major. A student is urged to declare a major by the time of registration for the first semester of the sophomore year, but is required to do so by the time of registration for the first semester of the junior year. Declaration of major is accomplished by completing a form available in the Office of the Dean of Engineering.

Double Major. If an engineering student completes simultaneously the requirements for a departmental major in arts and sciences and the requirements for a Bachelor of Science in Engineering degree, or satisfies simultaneously the requirements for two engineering majors, the official record will indicate this fact. However, the Director of Undergraduate Studies for the second major must certify that the departmental major requirements have been met. The student must initiate the procedure, either through the Dean of the School of Engineering or through the Director of Undergraduate Studies in the second department. The completion of the requirements for the major in this department must be confirmed no later than the time of registration for the final semester. Courses which are common to both majors shall be counted toward satisfying the requirements of both majors.

Interdisciplinary Programs in Engineering. These programs parallel the major programs in biomedical, civil, electrical, and mechanical engineering, but are not individually accredited by ABET. They provide special opportunities for study in interdisciplinary fields, such as energy conversion, biomedical engineering, engineering mechanics, materials science, ocean engineering, pollution control, systems and controls, and urban engineering, leading to the Bachelor of Science in Engineering degree, which may be arranged with approval of the engineering faculty. Any student, in consultation with the adviser or another faculty member, may propose a unique combination of courses designed to meet particular career objectives. The proposal should be submitted to the Engineering Faculty Council, through the Dean of the School of Engineering, for approval; it may be submitted as early as the second semester of the freshman year and must be submitted before the beginning of the senior year. The proposal should include the student's reasons for pursuing the suggested program of study, and it must show how the proposed courses satisfy the following requirements:

1. The proposed program of study meets the general requirements for the Bachelor of Science in Engineering degree but cannot be accommodated by the approved departmental requirements in biomedical, civil and environmental, or electrical engineering, or mechanical engineering and materials science.
2. A program of at least eight engineering courses is included to provide depth in the chosen interdisciplinary area of study.
3. A program of at least four courses, in addition to the seventeen courses listed under general requirements, is included to provide breadth in technical areas (engineering, natural science, and mathematics).
4. The remaining courses, which are treated as electives, require the approval of the student's adviser.

Each student enrolled in an approved interdisciplinary program will be assigned to the appropriate engineering department for administrative purposes.

Program in Engineering and Public Policy. Engineering students may pursue a program of study leading to the degree of Bachelor of Science in Engineering, with a major in one of the five engineering fields of study and a second major in public policy studies. The program is sponsored by the School of Engineering and the Institute of Policy Sciences and Public Affairs. To qualify for a degree with this second major, a student must satisfy the series of courses, which may be characterized as electives within the engineering curriculum, that meet the requirements for the major in public policy studies. These requirements are a modified parallel of the requirements of the major in public policy studies as described in the "Courses of Instruction" chapter, this bulletin.

Bachelor of Science in Engineering/Master of Science Program. This program provides students with an opportunity to plan a coordinated five-year program of studies in the School of Engineering leading to both the Bachelor of Science in En-

gineering and Master of Science degrees. Application for admission to this integrated program may be made during the junior or senior year. Provisional admission to the Graduate School may be granted when the student enrolls for the semester during which the Bachelor of Science in Engineering degree requirements will be completed. Graduate level courses during this period which are in excess of Bachelor of Science in Engineering requirements may be credited toward fulfillment of the Master of Science degree requirements.

Students must complete thirty semester hours of credit specifically approved for the Master of Science degree under the prevailing graduate rules; up to six of these hours may be thesis research if the program includes a written master's thesis. No more than nine semester hours of graduate work can be completed concurrently with completing the Bachelor of Science in Engineering degree requirements.

Residence Requirements. At least sixteen semester courses must be completed satisfactorily at Duke. This must include the work of the final two semesters, with the following exceptions: the student who has completed more than four full semesters of work at Duke may take the last two courses elsewhere; others may take the last course elsewhere. The courses taken elsewhere must be approved in advance by the student's major adviser and academic dean.

Pass/Fail Grading Option. With the consent of the instructor and the faculty adviser, an engineering student may choose to be graded on a pass/fail basis in up to four unrestricted electives or social sciences-humanities electives within the thirty-two-course program. A student may take no more than one course on a pass/fail basis each semester.

Repetition of Courses. An engineering student who has earned a grade of *D-*, *D*, or *D+* in a required mathematics course or a required engineering course may, with permission of his or her adviser, Director of Undergraduate Studies, and academic dean, repeat the course. Both grades will remain on the student's record. Only one credit may be counted toward fulfilling graduation requirements.

Academic Honors. To determine eligibility for academic honors, only grades earned at Duke are used in calculating the average.

Dean's List. In recognition of superior academic achievement, students who carry a normal academic load and earn a *B* average or higher in the two semesters of an academic year are placed on the Dean's List if the following additional requirements are met:

1. Grades other than *P* have been earned in six semester courses.
2. No incomplete or failing grade has been received during the academic year.

Class Honors. Students who carry a normal academic load and earn a *B+* average on all work for the year are eligible for class honors provided the following conditions are also met:

1. Grades other than *P* have been earned in six semester courses.
2. No incomplete or failing grade has been received during the academic year.

Continuation Requirements. A student must achieve a satisfactory record of academic performance each semester and make satisfactory progress toward graduation to remain enrolled in the University.

A student must pass at least three courses in each semester, except for the first semester of the freshman year, in which at least two courses must be passed. A student who fails to meet this continuation requirement must leave the University for at least two semesters. A complete summer session may be counted as a semester. Following application for readmission, return must be approved by the Dean and the Director of Undergraduate Studies in the student's major department. If the student thereafter fails to pass three courses in a semester, permanent dismissal from the University usually results. A student who enrolls in more than four courses in

a given semester and fails two or more of them will not be permitted to enroll for more than four courses in the following semester without approval of the Dean. In addition, a student may be dismissed temporarily or permanently for failing to make satisfactory progress toward graduation, including satisfactory progress toward fulfillment of curricular requirements within ten semesters.

The term *satisfactory progress* shall be defined also by the following schedule: *

1. To begin enrollment in the second year, a student must have passed 6 s.c. and earned *P*, *C-*, or better in 3 (4) s.c. †
2. To begin enrollment in the third year, a student must have passed 13 s.c. and earned *P*, *C-*, or better in 9 (11) s.c.
3. To begin enrollment in the fourth year, a student must have passed 20 s.c. and earned *P*, *C-*, or better in 16 (18) s.c.
4. To begin enrollment in the fifth year, a student must have passed 27 s.c. and earned *P*, *C-*, or better in 23 (25) s.c.

Grade Requirement for Graduation. Of the thirty-two semester courses which fulfill the specified categories in the Bachelor of Science in Engineering degree requirements, twenty-eight (thirty) or their equivalent in number must be passed with grades of *P*, *C-*, or better.

*Numbers in parentheses apply to all students matriculating in September 1984 and thereafter.

†Continuation from the first to second year shall be based only on course credits earned at Duke and credits received through the Advanced Placement program.

Academic Procedures and Information



Advanced Placement

Scores on the tests discussed below and documented previous educational experience are the criteria used to determine a student's qualifications for certain advanced courses. If questions arise, students should consult the Director of Undergraduate Studies in the appropriate department.

College Board Advanced Placement Program (APP) Examinations. A score of 3, 4, or 5 on College Board Advanced Placement Program Examinations, taken prior to matriculation in college, is the basis for consideration for credit and placement in advanced courses in art, botany, chemistry, computer science, English,* French, German, history, Latin, mathematics, music, physics, Spanish, and zoology. The record of a student presenting such a score and desiring to continue in the same subject at Duke will be evaluated for credit and for placement in an advanced course. Departmental policies regarding advanced placement and credit may vary. In the case of French, German, Latin, and Spanish, APP scores of 3, 4, or 5 may result in placement in courses at the 100 level; approval of the Director of Undergraduate Studies or Supervisor of Freshman Instruction in the appropriate department is required before final placement is made. Credit may be granted for one or two courses in each subject area, with the approval of the academic department concerned. A student who has earned a score of 3 and who is granted deferred credit by individual department policy must earn a grade of C– or better in the first course taken to validate the deferred credit. Pass/fail grading is *not* an option for such courses. The validating course must be completed by the end of the sophomore year. Several departments award neither credit nor placement for scores of 3. Also, see the section on residence requirements in the chapter "Degree Programs."

College Board Achievement Tests. Scores on College Board Achievement Tests are the basic criteria for placement in French, German, Italian, Spanish, Latin, and mathematics. Course credit is not given for courses bypassed. The following tables will assist students in making reasonable course selections in the subjects indicated.

*The score in English Advanced Placement, although qualifying a student for advanced courses in literature, does not satisfy the requirement in Writing.

French*		German		Italian	
College Board Achievement Scores	Course Placement	College Board Achievement Scores	Course Placement	College Board Achievement Scores	Course Placement
200-370	French 1-2	200-390	German 1†	200-440	Italian 1-2
380-440	French 12	400-560	German 63	450-540	Italian 63
450-540	French 63	570 plus	Third year‡	550 plus	Italian 111
550-590	French 74, 76				
600	French 100-level course§				

Spanish*		Latin		Mathematics#	
College Board Achievement Scores	Course Placement	College Board Achievement Scores	Course Placement	College Board Achievement Scores	Course Placement
200-420	Spanish 1-2	200-520	Latin 1†	480	Math. 9-10
430-490	Spanish 12	530-630	Latin 63	490-540	Math. 19
500-570	Spanish 63	640 plus	Third year‡	550-580	Math. 31A
580-620	Spanish 76			590-800	Math. 31 or 33
630 plus	Spanish 100-level course§				

*In these languages students are permitted to drop back one level without loss of credit (e.g., from 101 to 74 or from 74 to 63). No credit will be allowed for courses two levels below the achievement score (e.g., students with a score of 640 in French or Spanish could not receive credit for 63, but could for 74 or 76). In no case will credit be given for 1-2 to students with three or more years of high school French or Spanish.

†The first year of a language may *not* be taken for credit by a student who has completed more than two years of that language in secondary school. In rare cases, an exception may be granted with permission of the Director of Undergraduate Studies in the appropriate department.

‡An exception may be granted in consultation with the Director of Undergraduate Studies.

§French 111 and Spanish 110 are not open to first semester freshmen with a score of less than 700.

#In the absence of an Achievement Test score, course placement is determined by the SAT score as follows: 490 or below—Math. 9-10; 500-600—Math. 19; 610-650—Math. 31A; 660-800—Math. 31 or 33; 750-800—Math. 31X.

College Board College Placement Tests. The College Board Placement Tests in French, German, Italian, Latin, and Spanish should be taken during orientation by (1) those students who desire to continue in the language but have not taken the College Board Achievement Test, and (2) those students who, having taken the College Board Achievement Test, wish to challenge the score for the purpose of qualifying for a higher level language course. These tests should be taken also (3) by all students in Trinity College who are presenting just *two* units of high school credit (*grades 9-12, inclusive*) in a single foreign language and who have not taken the College Board Achievement Test in that language to demonstrate their proficiency. Taking the tests under these circumstances is necessary in order to ascertain whether the foreign language proficiency requirement has been met at entrance. See the statement on the requirement in the section on foreign language in the chapter "Degree Programs."

All freshmen who plan to take mathematics during their first semester at Duke, and who do not submit the College Board SAT score or College Board Achievement

Test score in mathematics, must take the College Board College Placement Test in mathematics during orientation. Students who have been placed in Mathematics 9-10, 19, or 31 but believe that their background in mathematics justifies a higher course placement need not take the College Board College Placement Test, but they should consult the Director of Undergraduate Studies or Supervisor of Freshman Instruction in the Department of Mathematics. Course credit is not given for courses bypassed on the basis of the placement tests.

Placement in Russian. Students who wish to continue in Russian at Duke should see the Director of Undergraduate Studies in the Department of Slavic Languages and Literatures. In the case of Russian, either College Board Achievement Test scores or College Board Placement Test scores serve as criteria for placement. Lacking these, the department offers an examination which is used in conjunction with other criteria for placing students at the appropriate course level.

Reading Out of Introductory Courses. Students demonstrating academic ability may be granted the option of reading out of an introductory or prerequisite course in order to allow them to advance at their own pace to upper level work. No course credit may be earned by reading out. Reading for a course and auditing are mutually exclusive procedures. Students must be recommended for the reading option by their academic deans, and their proposed programs of reading must be approved by the appropriate Director of Undergraduate Studies. Students may be certified for advanced course work by passing a qualifying examination prepared by the department. When an advanced course is completed, an entry is made on the permanent record that the qualifying examination was passed, but no course credit is awarded. Further information is available from the academic deans.

Transfer of Work Elsewhere

Evaluation of Work Taken Elsewhere. For students transferring from another accredited, degree-granting institution, credit of up to sixteen semester courses may be granted. Courses in which grades of less than C- have been earned are not accepted for transfer credit; students seeking transfer credit for courses in which they earned a P grade must present official verification that the P is equivalent to at least a C- grade. The semester-course unit of credit awarded at Duke for satisfactorily completed courses cannot, of course, be directly equated with semester-hour or quarter-hour credits. Ordinarily, transfer students will not be awarded more than four semester-course credits for one semester's work unless they have satisfactorily completed more than the normal course load at the institutions from which they have transferred. All courses approved for transfer are listed on the student's permanent record at Duke, but grades earned are not recorded. Courses taken at other institutions prior to matriculation at Duke are evaluated by the University Registrar and by the faculty.

Limitation on Work Taken Elsewhere. After matriculation as a full-time degree candidate in Trinity College of Arts and Sciences, a student may receive credit toward the Bachelor of Science or Bachelor of Arts degree for a maximum of two courses taken at another institution, whether in the summer while regularly enrolled at Duke, while withdrawn voluntarily from the college, or while on leave of absence (other than for an approved program of study abroad or an approved program at another institution in the United States). Full-time degree candidates in the School of Engineering may receive credit towards the Bachelor of Science in Engineering degree for a maximum of six courses taken at another institution. Ordinarily, no credit will be accepted for course work taken while a student is withdrawn involuntarily. For purposes of this regulation, advanced placement credit is not considered as work taken at another institution. The provision of the residence requirement which allows a student to take

the final courses elsewhere remains in effect. See the section on residence requirements in the chapter "Degree Programs."

Students may not transfer credit from two-year colleges after completing their sophomore year. At least half the courses submitted toward fulfillment of a student's major field must be taken at Duke, but departments may make exceptions to this rule in special circumstances. No credit is given for work completed by correspondence, and credit for not more than two semester courses is allowed for extension courses.

Approval for Courses Taken Elsewhere. Approval forms for courses to be taken at institutions other than Duke may be obtained from the offices of the academic deans. Students wishing to transfer credit for study at another accredited college while on leave or during the summer must present a catalog of that college to the appropriate dean and Director of Undergraduate Studies and obtain their approval *prior* to taking the courses.

Advising

Students and their advisers confer when necessary, but they should confer at least once before every registration period to review goals, plans for achieving them, and any problems encountered or anticipated. Before declaring a major in Trinity College, students confer with the premajor adviser, the academic dean for premajor students, or the academic dean in the division of their interests. Upon declaring a major, the student is assigned a faculty adviser; the academic dean for that division is also available for consultation. In the School of Engineering, the adviser's signature is necessary for registration and all course changes. Much good advising is informal and occurs in conversation with members of the faculty.

Registration

Students are expected to register at specified times for each successive term. Prior to registration each student receives special instructions and registration materials. Students prepare a course program, submit it at an appointed time to their advisers for review, and present the approved schedule at registration. In the School of Engineering, the schedule must be signed by the adviser.

Students who expect to obtain certification to teach in secondary schools should consult an adviser in the education program prior to each registration period to ensure that they are meeting requirements for state certification and that they will have places reserved for them in the student teaching program.

Those who register late are subject to a \$25 fine. Students who fail to register for the fall or spring semester are withdrawn and must apply for readmission if they wish to return; they also forfeit their registration deposits unless they indicate at the time of registration their intention not to continue in the University the following term. Those students who have not paid any fees owed to or fines imposed by the University (such as laboratory fees, library fines, and parking fines) by the date specified for registration for the following term will not be permitted to register for the following term until such fees and fines have been paid in full, notwithstanding the fact that the student may have paid in full the tuition for the following term.

Students planning to register for a course under the reciprocal (interinstitutional) agreement must have the course approved by the appropriate Director of Undergraduate Studies and their academic dean. Further information about registration procedures once approval is given may be obtained from the Office of the Registrar. See the chapter "Special Programs" for information regarding the reciprocal agreement with neighboring universities.

Term Enrollment and Identification Cards. Students are to report to 103 Allen Building at the beginning of each term to obtain enrollment cards. (These cards should

be carried at all times along with identification cards which are issued at the time of matriculation.) Failure to report, or to account beforehand for an absence, entails a loss of registration in courses. Official enrollment is required for admission to any class. Students who will not be attending a summer term or course for which they registered (registration card submitted), must officially drop the course(s) prior to the beginning of class whether or not they have paid tuition and fees. See the chapter "Financial Information" concerning summer refunds and withdrawal charges.

The enrollment and identification cards are means of identification for library privileges, University functions, and services available to University students. Students are expected to present their cards on request to any University official or employee. The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. Loss of the cards should be reported immediately to the Office of the Registrar where new ones can be obtained for \$5.

Concurrent Enrollment. A student enrolled at Duke may not enroll concurrently in any other school or college without special permission of the appropriate academic dean. See, however, the statement regarding the reciprocal agreement with the University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University at Raleigh.

Course Changes after Classes Begin in the Fall and Spring Terms. During the drop/add period changes may be made in course schedules. Receipts for course changes made in 103 Allen Building must be retained.

In Trinity College of Arts and Sciences, students may drop and add courses during the first week of classes in the fall and spring terms at their own discretion; during the second week of the drop/add period they may drop courses at their own discretion, but the signature of the appropriate instructor is required for adding a course. After the drop/add period no course may be added; also, a course may not be changed to or from the pass/fail or audit basis. To withdraw from a course, students must obtain permission from their academic deans, and for reasons of course overload the academic dean may give permission up to midterm. Ordinarily, courses may not be discontinued after midterm. In extraordinary circumstances, however, e.g., for reasons of health, the academic dean may allow a student to withdraw. After the drop/add period, the student receives a *WP* grade (withdraw passing) or *WF* (withdraw failing) from the instructor. Course work discontinued without the dean's permission will ordinarily result in a grade of *F*.

Within the School of Engineering, the signature of the adviser is necessary for dropping or adding courses after classes begin. After the drop/add period no course may be added, and in order to withdraw from a course students must obtain permission from their academic deans. Factors to be considered by the dean include health, necessary outside work, and, up to the time midterm grades are issued, a course overload. Until the last four weeks of classes in the semester, the instructor must certify the student's standing in the course as satisfactory or as failing. In the former case a *WP* will be entered on the permanent record and in the latter, a *WF*. During the last four weeks of classes in any semester, or the equivalent in the summer terms, *W* will be assigned if, in the judgment of the student's dean, compelling and extraordinary circumstances make it necessary for the student to drop the course; otherwise, the course must be continued to the end of the semester. A course discontinued without approval will result in a grade of *F*.

When students note an error in their course schedules, they should consult with their academic dean.

Course Changes for the Summer Terms. Course changes are accomplished by submitting the three-part drop/add form(s) to the Office of the Summer Session, 121 Allen Building. Beginning April 30, all course changes must be approved by the ap-

propriate academic dean. The Director of the Summer Session serves as the dean for all non-Duke students. Students who are out of town must contact their academic dean directly to arrange for dropping or adding courses.

Courses may be added before or during the first three days of the term (see also the section on late registration and payment). After the third day of the term, no course may be added. Prior to the first day of the term, students may drop a course or courses for which they have registered without penalty. During the first three days of the term, students will be charged 20% of the tuition for dropping a course or courses if this results in any reduction of tuition. With the permission of the academic dean a course may be dropped until the end of the fourteenth day of a regular summer term (eleventh day at the Marine Laboratory); the instructor then assigns a WP or WF grade. Course work discontinued without the approval of the dean will result in a grade of F. (See also the section on Withdrawal Charges and Refunds.)

Course Load and Eligibility for Courses

Students are reminded that it is their responsibility to be certain that their course load conforms with academic requirements. The normal and expected course load in the fall or spring term is four semester courses. To take fewer than four or more than five semester courses, students must have the approval of their academic deans. No student, however, may take more than six courses in any semester. With the approval of their academic dean, seniors in Trinity College and the School of Engineering who need fewer than eight semester courses for graduation requirements may take an underload.

Maximum course program for one term of the summer session is two courses, one of which may be a laboratory course. Students in the School of Engineering may enroll in two laboratory courses. In addition, a student may enroll in a physical education activity or dance activity course for one-half course credit.

Self-pacing during a given calendar year (two regular semesters plus two Duke summer terms) is possible with the approval of the student's academic dean and faculty adviser (and in consultation with the Office of Undergraduate Financial Aid, if the student is receiving monetary support from the University). Prior to the beginning of a semester, a student may apply to take fewer than four courses for one or more semesters in a given calendar year after the freshman year, providing the student can meet the continuation requirements described in the chapter "Degree Programs." Advanced placement credits and summer work taken elsewhere are excluded when minimum annual continuation requirements are considered under this plan.

Eligibility for Courses. The rules established by the Graduate School provide that juniors and well-qualified sophomores may enroll in a 200-level (senior-graduate) course if they have obtained written consent of the instructor, as well as that of the Director of Graduate Studies in the department concerned. Undergraduate students may not enroll in 300- or 400-level courses.

Seniors who, at the beginning of a term, lack no more than three semester courses toward the fulfillment of the requirements for the Bachelor of Arts or Bachelor of Science degree may enroll in graduate courses, for a maximum course load of five semester courses. Admission to the Graduate School is necessary.

Students may not register for two courses meeting at the same time. In Trinity College no course may be repeated for credit or a grade if a passing grade has been earned previously, except where noted in the course description. A course previously passed, however, may be audited.

Course Audit

Students who audit a course submit no daily work and take no examinations. They do not receive credit for the course. With the written consent of the instructor, a full-time degree student is allowed to audit one or more courses in addition to the normal program. Physical education activity, studio art, applied music, and dance activity courses may not be audited. In the fall or spring term, a part-time degree student may audit courses by payment for each course audited. In a summer term, a student carrying two courses for credit may be given permission to audit, without additional fees, nonlaboratory courses with the above exceptions. A student in a summer term carrying less than a full program for credit may secure permission to audit (above exceptions apply) but is required to pay half the University fee for the course. After the drop/add period in any term, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may be reclassified as an auditor. A student may not repeat for credit any course previously audited.

Faculty members, staff, alumni, employees and their spouses, as well as spouses of currently enrolled students, and members of the Institute for Learning in Retirement may audit courses without enrolling concurrently in another course. Formal application is not necessary: written permission from the instructor must be obtained and a course card must be signed by the Director of the Office of Continuing Education. Consult the chapter "Financial Information" for the appropriate fee schedule. Auditors must register on the Friday before classes begin.

Independent Study

Independent study enables a student to pursue individual research and reading in a field of special interest under the supervision of a member of the faculty. A student—with the approval of an adviser, the instructor, and the Director of Undergraduate Studies in the instructor's department—may enroll in independent study for any term at Duke. In Trinity College, instructors of independent study courses are expected to meet with the students enrolled at least once every two weeks during the fall or spring and at least once each week during a summer term.

House Courses

House courses, offered in the fall and spring terms, are organized by students within given residential units. They are intended to encourage students to take initiative in creating academic experiences that are not offered by the departments. A house course must be sponsored by a faculty member in the arts and sciences, reviewed by the department of that faculty member, and approved by the Committee on Courses of Instruction of the Undergraduate Faculty Council of Arts and Sciences. House courses carry a half-course credit. In the School of Engineering, house courses cannot be used to meet degree requirements. In Trinity College not more than two semester-course credits earned in house courses may be counted toward the course requirement for graduation. House courses do not count toward other requirements. Grades are submitted on the pass/fail basis. The academic deans can provide further details.

Submission of Term Paper

Students who wish (under unusual circumstances) to submit a single paper for credit in more than one course must receive prior written permission from each course instructor. The student must indicate the multiple submission on the title page of the paper.

Declaration of Major or Division in Trinity College of Arts and Sciences

Each freshman must declare a division of interest (humanities, social sciences, or natural sciences), or a major, if desired, by registration in March of the freshman year. All students must declare a major before the end of classes in their fourth undergraduate semester. When a student declares a major, the second and third divisions must also be identified. Forms for registering an initial declaration of major are available to students in the Trinity College Premajor Advising Center. A student who, having already declared a major, wishes to change his or her area of concentration, completes a form in the Office of the Registrar.

The second major should be declared in the Office of the Registrar before the student registers for the final term. A change of departmental major or interdepartmental concentration must also be made in the Office of the Registrar. After declaring a major, a student is assigned an adviser in the department of the major and an academic dean in the division of concentration. Freshmen who declare a division rather than a major are advised by an adviser in the Premajor Center.

A student may declare an interdepartmental concentration after conferring with the Directors of Undergraduate Studies of the departments involved, and they or other advisers assist the student in preparing a program of course work. The program, which must be planned early in the undergraduate career, must consist of at least three courses beyond the introductory level in each of the departments. One of the departments should be identified as primarily responsible for the student's advising. A copy of the plan for the program, with a descriptive title which will appear on the student's permanent record, should be presented, along with the written approval of the Directors of Undergraduate Studies, to the appropriate academic dean. A student who declares an interdepartmental concentration must identify the second and third divisions and satisfy those requirements and all others for Program I.

A student may have a second major recorded on the permanent record; if the student's second major is not offered within the degree to be granted for completion of the first major, a notation of the second major will appear on the transcript. Majors offered within each degree are listed below:

Bachelor of Arts. Afro-American studies, anthropology, art design, art history, biology, botany, Canadian studies, chemistry, classical studies (ancient history and archaeology), comparative area studies, comparative literature, drama, economics, English, French, geology, Germanic languages and literature, Greek, history, Latin, mathematics, medieval and Renaissance studies, music, philosophy, physics, political science, psychology, public policy studies, religion, Slavic languages and literatures, sociology, Spanish, and zoology.

Bachelor of Science. Biology, botany, chemistry, computer science, geology, mathematics, physics, psychology, and zoology.

Changes in Status

Withdrawal and Readmission. Students who wish to withdraw from the college must give official notification to their academic dean. Notification must be received prior to the beginning of classes in any term or tuition will be due on a pro rata basis. (See the section on refunds in the chapter "Financial Information.") For students withdrawing on their own initiative after the beginning of classes and prior to the last four weeks of regular classes in the fall or spring term, or before the last two weeks of regular classes in a summer term, a *W* is assigned in lieu of a regular grade for each course. After these dates an *F* grade is recorded unless withdrawal is caused by an emergency beyond the control of the student, in which case a *W* is assigned by the student's academic dean.



Applications for readmission are made to the appropriate school or college. Each application is reviewed by officers of the school or college to which the student applies, and a decision is made on the basis of the applicant's previous record at Duke, evidence of increasing maturity and discipline, and the degree of success attendant upon activities during the time away from Duke. Students who are readmitted usually cannot be housed on campus.

Applications for readmission must be completed by December 1 for enrollment in January, by April 1 for enrollment in the summer, and by August 1 for enrollment in September.

Leave of Absence. An upperclassman in good standing may apply in writing to the appropriate academic dean to take a leave of absence for one or two semesters; the deadline for application for a leave is the end of the registration period for the semester immediately preceding the leave. Students returning from approved medical, financial, or study abroad leaves and desiring housing on campus will be placed in the general housing lottery, provided they have submitted the appropriate information to the Office of Student Affairs by the deadline noted above and provided that they lived on campus before taking their approved leave. Those students approved for personal leaves are not guaranteed on-campus housing, but will be given highest priority on the housing waiting list provided the same deadline and qualifications described above have been met. Unless an exception for an emergency is authorized by the students' academic deans, students applying after the course registration cited above will lose their priorities in University housing for the period following the leave.

Registration materials will be mailed to a student on leave, but final registration is, of course, contingent upon the student's fulfilling the terms of the leave. A student failing to register while on leave will be withdrawn from the University and will have to apply for readmission.

A student who undertakes independent study under Duke supervision and for Duke credit is not on leave of absence even if studying elsewhere. The student registers at Duke as a nonresident student and pays the appropriate fees or tuition at Duke. This also applies to Duke programs conducted away from the Durham campus.

Transfer between Duke University Schools. Students in good standing may be considered for transfer from one Duke undergraduate school or college to another, upon written application and request for a letter of recommendation from their academic dean. The review of requests to transfer involves consideration of a student's general academic standing, citizenship records, and relative standing in the group of students applying for transfer. The school or college to which transfer is sought will give academic counseling to a student as soon as intention to apply for transfer is known, although no commitment will be implied.

A student may apply to transfer at any time prior to or after receiving a baccalaureate degree. A student transferring to Trinity College of Arts and Sciences from the School of Engineering, prior to receiving a baccalaureate degree, may not use more than six professional school credits toward the Bachelor of Arts or Bachelor of Science degree. If admitted after having earned a baccalaureate degree, a student must undertake prescribed additional undergraduate work to qualify for a second baccalaureate degree.

Full-Time and Part-Time Degree Status. Ordinarily candidates for degrees are expected to enroll for a normal course load each semester. Students who need to change from full-time status to part-time status must request permission from their academic dean. For special reasons approved by the dean, a full-time student, who is qualified to continue, may register as a part-time student for not more than two courses (or two courses and a half-credit physical activity or dance activity course) during the fall and spring. Part-time students may not live in the residence halls.

Resident and Nonresident Status. See the chapter "Campus Life and Activities."

Nondegree to Degree Status. A nondegree student must apply to the Office of Undergraduate Admissions for admission to degree candidacy.

Class Attendance, Excused Absences, and Tests

Responsibility for class attendance rests with the individual student, and since regular and punctual class attendance is expected, the student must accept the consequences of failure to attend. Instructors may refer to the student's academic dean a student who is, in their opinion, absent excessively. As a rule, absences from required classes and tests are excused only for illnesses certified by a medical official of the University or for authorized representation of the University in out-of-town events. Officials in charge of groups representing the University are required to submit the names of students to be excused to the appropriate deans' offices forty-eight hours before absences are to begin.

Class times are officially scheduled at registration unless designated "to be arranged" (TBA). No class time may be changed without prior permission of the University Schedule Committee. Within-class tests (except for the final) are to be given at the regular class meeting times. Exceptions are made for block tests that have been approved by the University Schedule Committee. Hours set up for block examinations are 7:30 to 8:45 A.M. on Tuesdays and Thursdays.

Incompleted Course Work

If because of illness, emergency, or reasonable cause a student cannot complete work for a course, the student may request in writing the assignment of an *I* (incomplete) for the course. If the request is approved by the instructor in the course and by the student's academic dean, then the student must satisfactorily complete the work prior to the last class day of the fifth week of the subsequent semester or a grade of *F* will be recorded for the course. An *I* taken in the fall semester must be resolved in the succeeding spring term; an *I* taken in the spring or summer must be completed in the following fall term. A student not enrolled in the University during that subsequent semester will have until the end of the fifth week of the next semester of matriculation to clear the *I*. If a student whose work is incomplete is also absent from the final examination, an *X* is assigned for the course. Students may not complete work in a course after graduation. For a discussion of the possible impact of an *I* grade on continuation, see the sections on satisfactory performance each term in the chapter "Degree Programs."

Final Examinations and Excused Absences

Unless departmental policy stipulates otherwise, the form of the final exercise is determined by the instructor. However, a final written examination may not exceed three hours in length and a final take-home examination may not require more than three hours in the actual writing. Take-home examinations are due at the regularly scheduled hour of an examination, based on the time period of the class. The times and places of final examinations for the fall and spring terms are officially scheduled by the University Schedule Committee, generally according to the day and hour of the regular course meeting; changes may not be made in the schedule without the approval of the committee. If a final examination is to be given in a course, it will be given at the officially scheduled time. Final examination dates cannot be changed from the officially announced ones without permission of the Schedule Committee. No later than the end of the first week of classes of the fall and spring term, the instructor is required to announce plans for the final examination exercise. In fall or spring courses

where final examinations are not scheduled, examinations may not be given in the last week of classes. In the summer session, final examinations are held on the last two days of each term as specified in the summer session brochure calendar. Final examinations for short courses are held on the last day of the course.

If a student is absent from a final examination, an X is given instead of a final grade. *An acceptable explanation for the absence must be presented to the appropriate academic dean within forty-eight hours after the scheduled time of the examination, or the X is converted to an F.* If the absence is excused by an academic dean, the student arranges with the dean and the instructor for a make-up examination to be given at the earliest possible time. An excused X not cleared by the end of the following semester is converted to an F. A student not enrolled in the University during that following semester has until the end of the next semester of enrollment to clear the X unless an earlier deadline has been established by the instructor and the academic dean.

Grading and Grade Requirements

Final grades on academic work are sent to students after the examinations at the end of each term. Midterm advisory grade reports for freshmen are issued in the fall and spring.

Passing Grades. Passing grades are *A*, exceptional; *B*, superior; *C*, satisfactory; *P*, passing (see pass/fail option below); and *D*, low pass. These grades may be modified by a plus or minus. A *Z* may be assigned for the satisfactory completion of the first term of a two-course sequence, and the final grade for both courses is assigned at the end of the second course of the sequence.

Although the *D* grade represents low pass, in Trinity College not more than two courses passed with *D* grades may be counted among those required for year-to-year continuation or among the thirty-two courses required for graduation. Courses for which a *D* grade is earned, however, satisfy other requirements. Trinity College students may *not* repeat for credit any course in which a *D* grade or higher was earned.

Failing Grades. A grade of *F* or *U* (see pass/fail option below) indicates that the student has failed the course. The grade is recorded on the student's record. If the student registers for the course again, a second entry of the course and the new grade earned are made on the record, but the first entry is not removed.

Pass/Fail Option. With the consent of the instructor and faculty adviser, a student who has declared a major may register for grading on a pass/fail basis in one elective, nonmajor course each term. No degree requirements, except the requirement for thirty-two course credits and the continuation requirements, may be met by a course passed under the pass/fail option, unless the course is offered only on that basis. Preceptorials, discussion sections, seminars, and tutorials may not be taken on the pass/fail basis, unless the course is offered only on that basis.

After the drop/add period in any term, no changes from pass/fail to regular status, or from regular to pass/fail status, are permitted in any course. A *P* may not be converted subsequently to a regular letter grade, and the course may not be retaken under the regular grading system.

Grades When Absent from Final Examination. See the section on final examination and excused absences in this chapter.

Grades for Incompleted Work. See the section on incompleted work in this chapter.

WP, WF, and W Grades, and WE Designation. *WP* and *WF* grades may be issued if a student withdraws from a course after the drop/add period. (See the sections on course changes in this chapter.) *W* grades are issued if a student withdraws *from the*

University before the last four weeks of regular classes in the fall or spring semester, or before the last two weeks of classes in a regular summer term. (See the section on withdrawal and readmission in this chapter.)

WE indicates correction of an error in registration. It is not a grade.

Academic Recognition and Honors

In determining a student's eligibility for annual recognition and graduation honors, the colleges consider only grades earned in Duke courses, including courses taken in the University's own study abroad programs and under the interinstitutional agreement.

Annual Recognition. In acknowledgment of high academic achievement, recognition is given each summer to freshmen, sophomores, juniors, and seniors if the following requirements are met:

1. A normal academic load has been carried in the fall and spring terms.
2. Grades other than *P* have been earned in six semester courses.
3. No incomplete or failing grade has been received during the fall and spring terms.

The *Dean's List* recognizes students who earn a 3.3 average on all work in both the fall and spring terms. The *Dean's List with Distinction* includes students who earn a 3.6 average on all work in both the fall and spring terms of an academic year.

Graduation Honors. Students who earn the following averages for all grades recorded at Duke are graduated with honors: 3.3 average, *cum laude*; 3.6 average, *magna cum laude*; 3.8 average, *summa cum laude*.

Graduation with Distinction. Most of the academic departments have programs for graduation with distinction for students in Programs I and II and in all engineering programs. To be eligible for this honor, students must show promise of achieving, by the time of graduation, at least a *B* average in the major field. In addition, in the School of Engineering, some departments require at least a *B* average in all subjects and may have additional requirements.

Departments or interdepartmental honors committees may invite a student at the end of the sophomore or junior year to enter the Graduation with Distinction Program. After participation in a seminar in the junior or senior year, and/or a directed course of reading, laboratory research, or other independent study, the student must present the results of individual research and study in a distinguished piece of writing. The student's achievement, including the paper, is assessed by a faculty committee, and if the student has at least a *B* average in the major field, the committee may recommend that the student be graduated with distinction in the major field. A student engaged in an interdisciplinary program, including Program II, must attain an overall *B* average for courses taken in the departmental area of concentration or special study; achievement is assessed by an interdepartmental honors committee established by the Directors of Undergraduate Studies in the departments concerned. Interested students should consult the appropriate Directors of Undergraduate Studies.

Other Honors. Elections to the freshman honorary society, Phi Eta Sigma, are made at the end of the fall and spring semesters. Freshmen who earn a 3.5 average in four or more semester courses in their first semester of enrollment, or those whose cumulative average at the end of their second Duke semester is 3.5 or above in a program of eight or more semester courses, are invited to membership.

Elections of undergraduate students in Trinity College and the School of Engineering to membership in the national honorary society, Phi Beta Kappa, are held in the spring and fall. A review of the academic record of all prospective candidates is

conducted in the junior and senior years as well as in the term following graduation. (Doctoral students are, on the other hand, nominated by their department.) Eligibility for election is determined not by the University, but by the local chapter of the society. No less than four-fifths of earned credits must have been taken on the regular grading system (A-F). The total number of persons elected annually is limited by bylaw to 10 percent of the graduating class. Inquiries concerning distribution requirements for students in the School of Engineering should be directed to Professor Rhett George, Department of Electrical Engineering. All other inquiries may be directed to the Secretary of Phi Beta Kappa, Box 4795, Duke Station, Durham, North Carolina 27706.

Elections to the national engineering honorary society, Tau Beta Pi, are held in the fall and spring. Eligibility is determined on the basis of distinguished scholarship and exemplary character. Engineering students whose academic standing is in the upper eighth of the junior class or the upper fifth of the senior class have earned consideration by their local chapter. Inquiries may be directed to: Advisory Board, Tau Beta Pi, School of Engineering, Duke University, Durham, North Carolina 27706.

Students interested in various prestigious fellowships for graduate study (for example, the Fulbright-Hays, Luce, Marshall, Rhodes, and Winston Churchill) should consult the academic dean in charge of fellowships, 2022 Campus Drive. Specific information about deadlines and procedures is available through this office.

Notification of Intention to Graduate

The Diploma Card for students in Trinity College of Arts and Sciences and the School of Engineering is official notification that they expect to have completed all requirements for the degree and to receive the diploma on a particular graduation date. It is the responsibility of students to file the card on or before established deadlines. For students in Trinity College, the cards, to be filed during the fall registration period, are available in the College Recorder's office; in the School of Engineering, the Dean's office.

Commencement

Graduation exercises are held once a year in May when degrees are conferred upon and diplomas are issued to those who have completed degree requirements by the end of the spring term. Those who complete the requirements by the end of the summer term or by the end of the fall term receive diplomas dated September 1 or December 30, respectively. There is a delay of one month to two months in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Prizes and Awards

The achievements of undergraduate students are recognized in various fields of activity. The following prizes suggest the range of recognition.

The Robert E. Lee Prize. This prize was initiated by the late Reverend A. W. Plyler, of the Class of 1892, and Mrs. Plyler and continued through the generosity of Mrs. Richard B. Maxwell, Jr., of the Class of 1942. The sum of \$50 is awarded annually at commencement to the person in the senior class of Trinity College of Arts and Sciences or the School of Engineering who, in character and conduct, scholarship, athletic achievement, and capacity for leadership, has personified most nearly the standards of the ideal student.

Julia Dale Prize in Mathematics. This is an annual prize of at least \$100. The winner is selected by the Department of Mathematics on the basis of excellence in mathematics. In some years first and second prizes are given.

The Henry Schuman Music Prize. A prize of \$100 is awarded annually to an undergraduate of Duke University for an original composition of chamber music or a distinguished paper in music history or analysis. The award is sponsored by the Department of Music through a continuing gift from Dr. and Mrs. James H. Semans who named the prize after Henry Schuman, a lifelong friend of the Semans and Trent families, a talented amateur violinist, and one who helped to build valued collections in the Duke library.

The Edward H. Benenson Awards. These awards of up to \$2,500 each will be given annually to undergraduates with an interest in art, music, drama, or creative writing to broaden students' educational and professional objectives. Those interested should consult the Chairman of their major department.

The Louis Sudler Prize in the Arts. The award is presented annually by the Institute of the Arts to the graduating senior who, in the opinion of a special institute committee, has demonstrated outstanding achievement in artistic performance or creation. The prize of \$1,000 was established in 1983 through the generosity of Louis C. Sudler, Chicago, Illinois.

The Anne Flexner Memorial Award in Creative Writing. This award has been established by the family and friends of Anne Flexner, who was graduated from Duke in 1945. There are three categories: prose fiction (5,000-word limit), poetry (200-line limit), and one-act plays (7,500-word limit). As many as three awards may be given, but no more than one in any category, for the best pieces submitted by Duke undergraduates. The amount of each award will be \$200.

The David Taggart Clark Prize in Classical Studies. This prize is awarded to the senior major in Greek, Latin, or classical studies who is judged to have written the best honors essay of the year.

The Phi Lambda Upsilon Prize. Phi Lambda Upsilon, the honorary chemical society, annually awards a prize to the junior Bachelor of Science and senior Bachelor of Science majors having the highest overall academic averages. The prize is a one-year membership in the American Chemical Society. The recipients' names are inscribed on a plaque displayed in the Chemistry Library.

The Chemistry Department Award. This prize is awarded annually to an outstanding chemistry major, usually receiving a B.S. degree. The basis for selection is the student's independent research and interest in pursuing advanced work in chemistry. The prize is a one-year subscription to an appropriate journal.

The Merck Index Award. This prize is awarded annually to one or two graduating chemistry majors intending to pursue a career in medicine. Selection, by a faculty committee, is based on scholastic excellence. The prize consists of a copy of the Merck Index presented by Merck and Co., Inc.

The James B. Rast Memorial Award in Comparative Anatomy. The parents of James Brailsford Rast, a member of the Class of 1958 of Duke University, endowed this award in his memory. The award, consisting of the *Atlas of Descriptive Human Anatomy* by Sobotta and bearing the James B. Rast Memorial bookplate, is given annually to the student who demonstrates the greatest achievement in the study of comparative anatomy.

The Winfred Quinton Holton Prize in Primary Education. This prize was established in 1922 by gifts of Holland Holton, Class of 1907, and Lela Young Holton, Class of 1907, in memory of their son, Winfred Quinton Holton, with the income to be used to provide a prize for investigative work in primary education. This prize may be made annually. Competition is open to Duke seniors and graduate students who are eligible to obtain certification to teach. A student who wishes to be considered for the prize must submit a paper to be judged by a faculty committee in the education program.

The William Senhauser Prize. Given by the mother of William Senhauser in memory of her son, a member of the Class of 1942, who gave his life in the Pacific theater of war on August 4, 1944. This award is made annually to the student in Trinity College of Arts and Sciences or the School of Engineering who has made the greatest contribution to the University through participation and leadership in intramural sports. The winner of this prize is chosen by a committee appointed by the President of the University.

The Roger Alan Opel Memorial Scholarship. A grant is awarded annually to a Duke student who will spend a year of undergraduate study at a British university. The student is selected on the basis of intellectual curiosity, academic ability, and financial need. The award was established by the parents of Roger Alan Opel, a senior at Duke University who was killed in November, 1971.

The William T. Laprade Prize in History. This prize is offered in honor of William T. Laprade, who was a member of the Department of History at Trinity College and Duke University from 1909 to 1953, and Chairman of the department from 1938 to 1952. It is awarded to a senior who is being graduated with distinction and whose senior essay in history has been judged to be unusually meritorious.

The Edward C. Horn Memorial Prize for Excellence in Zoology. Given each year to the graduating zoology major who has shown, in the opinion of the zoology faculty, the highest level of academic achievement and promise, this prize is offered in memory of Professor Edward C. Horn. It is a tribute to his warm regard for students and faculty and his appreciation of scholarly excellence. The prize consists of books appropriate to the student's field of interest.

Alona E. Evans Prize in International Law. An annual award to an undergraduate and/or graduate student in arts and sciences whose paper(s) on international law reflect(s) excellence in scholarship. Prizes of not more than \$250 each are derived from income earned on the generous bequest of Professor Alona E. Evans, A.B. '40, Ph.D. (political science) '45.

Robert S. Rankin Political Science Award. An annual award of \$100 is given to the most outstanding student in the field of American government and constitutional law. The funds are donated in memory of Professor Rankin by Judge Jerry B. Stone, A.B. '44, J.D. '48.

N. Joseph Rahall Political Science Award. An annual award of \$100, contributed by Mr. Rahall, A.B. '35, is to be awarded for the best paper submitted by an undergraduate major in political science.

The Karl E. Zener Award for Outstanding Performance of a Major in Psychology. The Karl E. Zener Award is given to a psychology major who has shown outstanding performance and scholarship. The award, based on the student's total grade record and a paper submitted to the award committee, consists of a monetary prize and inclusion by name on a memorial plaque in Zener Auditorium.

The Richard L. Predmore Award in Spanish. Given each year to an outstanding Spanish major in honor of Richard L. Predmore, Professor of Spanish at Duke University from 1950-1978 and Dean of the Graduate School from 1962-1969.

The Robert J. Niess Award in French. Given each year to an outstanding French major in honor of Robert J. Niess, Professor of French at Duke University from 1972 to 1981.

The Walter J. Seeley Scholastic Award. This award is presented annually by the Engineers' Student Government to that member of the graduating class of the school who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor the spirit of academic excellence and professional diligence demonstrated by the late Dean Emeritus Walter J. Seeley. It is hoped that this award will serve as a symbol of the man and the ideals for which he stood. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The American Society of Civil Engineers Prize. The prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding civil engineering seniors, upon recommendation of the faculty of the civil engineering department. The basis for selection is the student's scholastic record, contribution to the student chapter, and participation in other college activities and organizations. The prize consists of a certificate of award and the payment of one year's dues in the American Society of Civil Engineers.

The George Sherrerd III Memorial Award in Electrical Engineering. This award is presented annually to the senior in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and has rendered significant service to the School of Engineering and the University at large. The award was established in 1958 by the parents of George Sherrerd III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. Recipients receive a monetary award, and their names are inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award. This award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke branch of the Institute of Electrical and Electronics Engineers or significant contributions to electrical engineering. The award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmow Prize. This prize is awarded annually to students from North or South Carolina graduating in the Department of Electrical Engineering, who, in the opinion of the faculty of that department, and, as shown by their grades, have made the most progress in electrical engineering during the last year in school. The prize consists of a certificate of award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded the baccalaureate degree.

The Raymond C. Gaugler Award in Materials Science and Engineering. This award is presented annually to the senior who has made the most progress at Duke in developing competence in materials science or materials engineering. The basis for selection is the student's scholastic record, research, or design projects completed at Duke, and interest in a materials-related career. The award has been established by Patricia S. Pearsall in memory of her grandfather, Raymond C. Gaugler, who was President of the American Cyanamid Company prior to his death in 1952.

The American Society of Mechanical Engineers Award. This award is presented annually to a senior in mechanical engineering for outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The award consists of a certificate of recognition.

The School of Engineering Student Service Award. This award, established in 1978, is given to those graduating seniors who, by their contributions of time, effort, and spirit, have significantly benefited the community of the School of Engineering. The names of the recipients are inscribed on a plaque displayed in the Engineering Building.

The J.C. Heyward Scholarship Award. This award is presented annually to an outstanding senior in mechanical engineering at Duke University. The recipient is chosen by a committee of the mechanical engineering faculty and selection is based on academic excellence, engineering ability, and leadership. The recipient receives a monetary award and his or her name is inscribed on a plaque displayed in the Engineering Building.

The William Brewster Snow Award in Environmental Engineering. This award is presented to an outstanding senior in civil engineering who, through superior academic achievement and extracurricular activities, has demonstrated interest and commitment to environmental engineering as a career. Selection of the recipient is made by the civil engineering faculty. The recipient is presented with an inscribed plaque and his or her name is also inscribed on a plaque permanently displayed in the Engineering Building.

The Otto Meier, Jr. Tau Beta Pi Award. This award was established in recognition of Dr. Meier's leadership in establishing the North Carolina Gamma Chapter in 1948 and his continuous service as chapter adviser

until 1975. This award is given annually to the graduating Tau Beta Pi member who symbolizes best the distinguished scholarship and exemplary character required for membership. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The da Vinci Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior with the most outstanding academic record. This award commemorates the contributions of Leonardo da Vinci in laying the foundations for the study of biomechanics.

The von Helmholtz Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior who has made the most outstanding contribution to the department. This award commemorates the work of von Helmholtz in laying the foundations of biomedical engineering.

Aubrey E. Palmer Award. This award, established in 1980, is presented annually by the faculty of the Department of Civil and Environmental Engineering to a civil engineering senior in recognition of outstanding academic achievement. The award consists of a certificate of recognition and the name of the recipient inscribed on a plaque displayed in the Engineering Building.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers Outstanding Achievement Award. This award is presented annually by the Triangle Chapter of ASHRAE to two seniors in mechanical engineering. Selection is based on evidence of scholarly contribution in the HVAC field such as a distinctive project or outstanding term paper. The award consists of a United States savings bond presented to each student.

Education Records

Duke University adheres to a policy permitting students access to their education records and certain confidential financial information. Students may request review of any information which is contained in their education records and may, using appropriate procedures, challenge the content of these records. An explanation of the complete policy on education records may be obtained from the Registrar's office.

No information, except directory information (see below), contained in any student records is released to persons outside the University or to unauthorized persons on the campus, without the written consent of the student. It is the responsibility of the student to provide the Office of the Registrar and other University offices, as appropriate, with the necessary specific authorization and consent.

Directory information includes name, addresses, telephone listing, date and place of birth, photograph, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and most recent previous educational institution attended. This information may be released to appear in public documents and may otherwise be disclosed without student consent unless a written request not to release this information is filed in the Office of the Registrar by the end of the first week of classes each term.

Special Programs



International Studies

The University's Center for International Studies coordinates and supports a wide array of research and teaching activities on international issues in Arts and Sciences and the professional schools. Faculty associated with the center come from diverse disciplines and reflect a wide range of intellectual interests. Their primary bond is a concern with peoples, events, movements, and institutions outside the United States; relations among nations; and activities and institutions in the United States that affect the rest of the world. These faculty share the belief that many, if not most, matters of importance occurring within the United States normally produce significant effects abroad and that important activities that take place abroad frequently have impact upon this country. They agree that such perceptions, and the awareness of relationships among peoples, events, cultures, movements, institutions, and processes are essential for an appreciation of the world in which we live and deserve primary emphasis in teaching and research in the University.

The functions of the center are to provide focus, structure, and support to the research efforts of associated scholars and to serve as a catalyst for the coordination of varied research undertakings. It also exists to provide a conduit for the dissemination of these undertakings and to foster international activities in educational, research, and governmental institutions in the southeastern United States.

The Center for International Studies is involved in monitoring and initiating change in the international curricula of the undergraduate, graduate, and professional schools of the University. It has a special interest in undergraduate education, and through a variety of programs and activities, makes a contribution to the undergraduate academic experience. It seeks to attract students to study in the wide range of international and comparative courses available and administers the major of the Program in Comparative Area Studies where students can concentrate on Africa, East Asia, Latin America, the Middle East, Russia, South Asia, Canada, or Western Europe. (See the chapter "Courses of Instruction.") All students are encouraged to pursue study abroad opportunities as well as language study in both non-Western and Western languages. The center also works toward establishing a closer relationship between foreign students and those interested in international studies (see the section on International House in the chapter "Campus Life and Activities").

Additional information on international studies and the Program in Comparative Area Studies is available from the Center for International Studies, 2122 Campus Drive, Durham, North Carolina 27706. Area studies function in centers, institutes, or programs in the following areas:

Asian-Pacific Studies. This program, administered by the Asian-Pacific Studies Institute, supports and encourages Asian and Pacific studies with special emphasis on Japan and China. Courses offered cover a range of disciplines including Japanese, Chinese, anthropology, economics, art, history, political science, and religion. The institute provides support for visiting lecturers and makes available a limited number of fellowships annually. Study abroad opportunities are available in China and Japan. An East Asia concentration is possible for majors in comparative area studies.

Canadian Studies. The Canadian Studies Center administers the Canadian Studies Program which offers courses introducing students to various aspects of Canadian life and culture. Courses and lectures in a wide range of disciplines in the humanities and the social sciences are designed to increase students' knowledge and understanding of Canada. Special emphasis is placed on Canadian problems and comparisons of Canadian and American perspectives. Concentrations in Canadian studies are described in the chapter "Courses of Instruction." Study abroad opportunities are available.

Indian Ocean Studies. The Indian Ocean Studies Program combines the expertise of scholars who specialize in South Africa, East Africa, South Asia, and the Persian Gulf. A variety of courses is offered in the humanities and social sciences and guest lecturers are brought to Duke under the auspices of the program. A South Asian and African concentration is possible for majors in comparative area studies.

Islamic and Arabian Development Studies. The Center for Islamic and Arabian Development Studies, established in 1977 and assisted by grants from the government of Saudi Arabia and American corporations, administers this program. Students majoring in comparative area studies can concentrate in the Middle East choosing from among courses in Arabic, anthropology, history, literature, political science, and religion. The center provides financial support for outside lecturers in an interdisciplinary Islamic civilization course, a survey course on contemporary Arab affairs, and a senior-graduate seminar in comparative development problems in the Islamic world. The center also presents an outreach program to colleges and universities in the Southeast, conducts international conferences, supports lecturers, and has offered a summer program for college teachers.

Latin-American Studies. The Council on Latin-American Studies administers a comprehensive program in Latin-American studies. A wide range of courses in the humanities, social sciences, Portuguese, and Spanish are offered. Visiting professors and lecturers from Latin America, graduate fellowships, conferences, and summer programs abroad are supported by the program. Faculty associated with the program work closely with students majoring in comparative area studies who concentrate in Latin America.

Studies in Advanced Industrial Societies. This program combines the talents of experts in Western Europe, Japan, and North America in studies investigating problems common to advanced industrial societies. Faculty associated with the program work closely with students concentrating in Western Europe in the major in comparative area studies.

Russian and East European Studies. This program concentrates on Eastern Europe. It encourages proficiency in the Russian language. The faculty work closely with students concentrating on Russia in the major in comparative area studies.

Health Care in Developing Countries. This program concerns itself with the health problems of the Third World—their nature, the research needed to deal with them, and the delivery of health care to persons in need. In 1985 the Center for International Studies will offer an introductory course for freshmen and sophomores on the subject of health care in the developing world.

Study Abroad

A Duke student may earn credit for approved work completed during the academic year at a foreign university or for an approved program abroad sponsored by Duke or by another accredited American college or university in the fall, spring, and summer. To receive the maximum amount of study abroad transfer credit at Duke—four course credits for a full semester, eight for a full academic year, two for a summer—a student is expected to take a full, normal course load, as defined by the other accredited institution involved. No additional study abroad transfer credit will be awarded for a course overload. A leave of absence from the University is granted for a semester or academic year of approved study abroad. Whenever possible, arrangements are made for students to register, while abroad, for the term in which they plan to return.

SEMESTER AND ACADEMIC YEAR PROGRAMS

A student who wishes to receive transfer credit for study abroad should take into account the following criteria established by the faculty and administered by the Committee on Study Abroad:

1. a scholastic average of at least a *B* – (a student lacking this average may petition the academic dean responsible for study abroad if there are unusual circumstances);
2. certification, when applicable, from the foreign language department concerned, that the student has an adequate knowledge of the language of the country in which study is pursued;
3. approval, obtained before leaving Duke, of the appropriate Directors of Undergraduate Studies for the courses to be taken abroad, as well as approval of the program and the courses by the dean responsible for study abroad;
4. permission for leave of absence once program plans are complete.

Duke, at present, offers various programs in cooperation with other universities during the fall and spring terms. Students accepted may study in:

Austria. From time to time Duke sponsors a term program in Vienna for members of the Wind Symphony and other interested students. More information is available from Professor Paul Bryan, Department of Music.

Canada, Montreal. Duke students participating in the Duke/McGill University Exchange Program may spend one semester or academic year at McGill, located in the Quebec city of Montreal. Because the language of instruction at McGill is English, program applicants need not have studied French although some knowledge of it would be advantageous. The program is sponsored by the Canadian Studies Center and Trinity College; information and application forms are available at 2022 Campus Drive.

China. In cooperation with Nanjing University and Beijing Teachers College, Duke conducts a six-month study program in the People's Republic of China in the summer and fall terms. The program includes a fall term at Nanjing University preceded by an intensive language session in Peking. Participants must have at least one year of Chinese language. Information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, and at 2022 Campus Drive.

Egypt, Cairo. Through an agreement with the American University in Cairo, Duke students may spend a semester or academic year there taking regular classes with Egyptian students. They may enroll in general courses in humanities, social sciences, and sciences, as well as in Arabic language and specialized courses in Middle Eastern studies. Applications are available at 2022 Campus Drive.

England, Canterbury. Selected Duke students may enroll for their junior year at the University of Kent at Canterbury in this exchange program administered by Trin-

ity College. The University of Kent is a residential university near Canterbury, the oldest cathedral city in England, located only fifty-five miles from London and close to France. More information is available at 2022 Campus Drive.

England, Oxford. Through a special arrangement with several colleges at the University of Oxford, selected Duke students may spend their junior year at Oxford as regularly enrolled visiting students. The students are treated exactly like their British counterparts, and most of them live in college housing. Students may choose to concentrate their study in any one of the major fields in the humanities, social sciences, or selected natural sciences. Each student is assigned a tutor. Applicants must have a very strong academic record; previous course work in the subject to be pursued at Oxford is also required. More information may be obtained from 2022 Campus Drive.

France, Paris. Following a trial program planned for the Spring of 1985, Duke hopes to offer a full-year program in Paris in conjunction with the University of Paris-VII in the heart of the Latin Quarter. The language of instruction will be French; one course will be offered by the Resident Director from Duke, and three courses will be taught by the faculty of Paris-VII. Applicants must have completed four semesters of French plus two courses at the 100-level or above with a grade of at least B+. Priority will be given to Juniors. For more information, contact 2022 Campus Drive.

Germany, Freiburg and Munich. Admission to these programs entails matriculation for an academic year at the University of Freiburg or the University of Munich. The student must, therefore, meet the admission standards of these universities. Courses are taken in German language, literature, art, and history through Wayne State University, while additional courses are taken at the German universities. More information is available from the Department of Germanic Languages and Literature, 104 Languages Building.

India, Madras. Duke students may participate in a fall semester program administered by the consortium of the South Atlantic States Association for Asian and African Studies, of which Duke is a member. The program offers courses in Indian history and culture, beginning Tamil, and independent research. More information may be obtained at 2022 Campus Drive.

Italy, Rome. As one of the participating members of the Intercollegiate Center for Classical Studies in Rome, Duke University nominates classics majors and other students with strong classical interests for admission to a term's work at the center, usually in the junior year. Instruction is offered in Greek, Latin, ancient history, ancient art, and archaeology. Some scholarship help is available. Additional information may be obtained from the Department of Classical Studies, 328 Carr Building.

Japan, Tokyo. Qualified students may be nominated each year by the Asian-Pacific Studies Committee for the junior year exchange program with International Christian University in Tokyo. This small, select university is noted for the international character of its student body (85-90 percent Japanese, 10-15 percent non-Japanese, primarily from other Asian nations and the United States). Courses may be taken in English as well as Japanese. More information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, and 2022 Campus Drive.

Spain. Duke occasionally sponsors a term in Madrid. More information may be obtained from Professor Miguel Garci-Gómez, Department of Romance Languages.

Further information concerning semester and academic year programs, as well as the Oxford Summer Program (described below) and non-Duke summer programs, may be obtained at 2022 Campus Drive. All Trinity College students are responsible for following the procedures and meeting the deadlines set forth in Duke's study abroad booklet, *Opportunities for Undergraduate Study Abroad*, available there. In all cases, the dean of study abroad must be informed in advance about a student's plans.

DUKE SUMMER PROGRAMS ABROAD

The Office of the Summer Session, in cooperation with several University departments, provides several opportunities for students to study abroad while earning Duke University credit. Operation of these programs is contingent upon a sufficient number of participants. Further information about these programs and about the time they will next be offered can be obtained from the program directors or the Office of the Summer Session, 121 Allen Building.

Canada. The Montreal Program provides an immersion in French and in the culture and history of the Quebec area through classroom study, structured and spontaneous excursions, and daily interpersonal contact. The students are based at the Université de Montréal and are offered a six-week course, which begins in mid-May. For further information see Professor Anne-Marie Bryan, Department of Romance Languages.

England, Oxford. The Duke/Oxford Summer Program, a six-week session at New College, Oxford, utilizes the Oxford tutorial system of education. The tutorial format is supplemented by the lectures given at the University of Oxford International Graduate Summer School by noted British scholars. Detailed information may be obtained in the Study Abroad Office, 2022 Campus Drive.

France. The Office of the Summer Session and the Department of Romance Languages sponsor a two-course, six-week program in Paris designed primarily for undergraduate students. It provides the opportunity to take Duke courses in the ambience of Paris. One course is in French Language or Literature; the other is in the humanities or social sciences. The language and literature courses, and often the other course, are taught in French. For further information see Professor Alexander Hull, Department of Romance Languages.

Germany. The Summer Session Office and the Department of Germanic Languages offer two programs at the Friedrich-Alexander Universität at Erlangen, Germany. One program provides an opportunity to study classroom German at different levels while living with a German family and participating in study, day trips, and excursions (May and June). In the other program, advanced students may choose from a variety of FAU courses and remain for a full summer semester (through early August). For further information see Professor Helga Bessent, Department of Germanic Languages.

Greece. The Summer Session Office and the Department of Classical Studies offer a program in Greece. Through readings, walking lectures, and touring the important sites and museums the students study the development of the preclassical, classical, Roman, and Byzantine cultures in Greece. For further information see Professor John Younger, Department of Classical Studies.

Israel. The Department of Religion, the Duke Center for Judaic Studies, and the Summer Session Office offer a summer program in Israel—in Jerusalem and Galilee. More information may be obtained from Professor Eric Meyers, Department of Religion.

Italy. The Department of Classical Studies and the Summer Session Office sponsor a one-course summer program in Italy. Through visits to sites and museums, walking lectures, and readings, the course will examine the history of the city of Rome from the earliest times through the Baroque and modern periods. Further information may be obtained in the Office of the Summer Session, 121 Allen Building.

Latin America. In 1985, summer programs designed for advanced undergraduate and graduate students will be offered in Brazil and Chile. Participants typically take two social sciences courses and study Latin American culture in depth. For further information see Professor Arturo Valenzuela, Department of Political Science.

Scotland. A two-course program on ethical issues in health and disease in the United States and Great Britain is offered in Edinburgh. Lectures by medical person-

nel are supplemented by site visits to medical facilities and health care agencies. The group spends several days during the concluding week studying in London. For further information see Professor Thomas McCollough, Department of Religion.

Soviet Union. The Office of the Summer Session and the Department of Slavic Languages will offer a two-course summer program in Leningrad for the first time in 1985. Russian language study at different levels will be offered, as well as a course in Russian Culture. Extensive excursions to Moscow and other cities, such as Erevan, Baku, and Yalta are included in this program. Classes in Leningrad will be taught in the Russian Language Institute for Foreign Students by faculty members of the Institute. Students will be housed in an international hotel. For further information contact Professor Edna Andrews, Department of Slavic Languages.

Spain. Two Duke in Spain Summer Programs offer students a variety of on-site experiences and an opportunity to learn and speak Spanish in an ideal environment. Students will live with Spanish families or in dormitories and will study Spanish culture, history, politics, literature, art, folklore, and religious beliefs. A Beginners' Program for students without any previous knowledge of Spanish and an Advanced Program for students with two or more semesters of Spanish are being offered. For further information see Professor Miguel Garci-Gómez, Department of Romance Languages.

Judaic Studies

Established in 1973 and supported by Duke University and the University of North Carolina at Chapel Hill, the Cooperative Program in Judaic Studies provides the opportunity of studying Jewish civilization through a broad range of courses including Hebrew language and literature, Yiddish language and literature, the archaeology of Palestine, and the history of Jewish religious thought. The program is administered by a joint planning council which also sponsors visiting speakers and professorships, library acquisitions, exchange programs with Israeli universities, summer school programs in Israel, and a publications program. The programs on the Duke campus are administered through the Duke Center for Judaic Studies. Students seeking further information on the program in Judaic studies should consult with Dr. Eric Meyers or Dr. Kalman Bland in the Department of Religion, 230 Gray Building.

Science, Technology, and Human Values

The Program in Science, Technology, and Human Values provides students an opportunity to explore the social and cultural dimensions of science, technology, and medicine. Through course work and a wide variety of extracurricular activities, students are introduced to the perspectives and insights of other disciplines in order to develop a richer and more informed understanding of their own field of specialization. The program brings together students and faculty from the sciences and engineering with their counterparts in the humanities and social sciences, with a heavy emphasis on interdisciplinary study and discussion. Detailed information is given in the chapter "Courses of Instruction" in the Bulletin.

Human Development

This interdisciplinary program provides opportunities to compare and to explore the complementarity of disciplinary perspectives on the biological, biomedical, psychological, and social aspects of human development. The program, which is more fully described under "Courses of Instruction," integrates courses, a research apprenticeship, and special events through an active advisory procedure. For more information and a program brochure, see the University Council on Aging and Human Development, 3502 Gerontology Building.

Women's Studies

The Women's Studies Program is a multidisciplinary forum for the study of women's roles and gender differences in various societies, past and present. Established in 1982, it offers courses, lectures, films, programs, and research support and brings together faculty and students from all fields who are concerned with both the theoretical questions stemming from the study of gender within the disciplines as well as the implications of such investigations for the status of women and men in contemporary society. The program seeks to encourage the use of new scholarship, which in the last two decades has challenged empirical and theoretical understandings of the sexes, from the perspectives of the humanities, the social sciences, and the biological sciences. For more information on Women's Studies, call the Office of Women's Studies, 105 East Duke Building, (919) 684-5683.

Twentieth-Century America Program

The Twentieth-Century America Program explores modern American society in a group of interrelated courses from the perspectives of history, literature, sociology, religion, and political thought. The program offers five courses in the fall, of which participants must take at least three. Some twenty-five students are selected for the program; all undergraduates may apply.

This special program provides the student with the opportunities that come from relatively small classes (often of seminar format), a program of interrelated and mutually reinforcing courses, and close relationships with professors and stimulating fellow students.

Courses that the program has offered include English 1 (special section), History 92, Sociology 101, Political Science 144S, and Religion 60 (see descriptions in this bulletin). Further information and application forms may be obtained from the director of the program who can be reached through the Premajor Advising Center.

Perspectives on Marxism and Society

Perspectives on Marxism and Society is a program devoted to the study of Marxist theories of society. Courses in the program focus on Marxism, not primarily as a political or ideological system, but as a scholarly methodology incorporating a variety of analytical techniques across a wide range of disciplines. The unifying theme of the program is a critical appraisal of Marxist methods of analysis and their social implications, considered in the light of theoretical alternatives and changing historical circumstances. Courses included in the program cover a wide range of subjects, including sexual and racial inequality, alienation, development and underdevelopment in the world system, labor processes, protest movements, and ideologies.

Students in the program will be required to take a core course in varieties of Marxist analysis. Four more approved courses, no more than three from one department, will complete the program of study. A certificate will be awarded to those who meet the requirements of the program. Students in the program will be expected to major in another discipline, with the program a supplement to their major. Full details concerning the program and its courses can be obtained by writing or calling the director, Professor Joseph Di Bona, Education.

Institute of the Arts

The Institute of the Arts coordinates activities in the performing and creative arts, thus encouraging the interrelationship of programs in drama, dance, studio art, imaginative writing, musical performance and composition, and film, and allowing the creation of new interdisciplinary courses and special events. A full description of this

program is in the chapter "Courses of Instruction." Students seeking further information on the Institute of the Arts should consult the office of the Institute, 120 East Duke Building, (919) 684-6654.

Duke University Marine Laboratory

The Duke University Marine Laboratory (DURL) is located adjacent to the historic seacoast town of Beaufort, North Carolina, with direct access to the Atlantic Ocean, Cape Lookout National Seashore Park and the Outer Banks, estuaries, sand beaches and dunes, wetlands, and coastal forests. Because of the richness and diversity of its flora and fauna, the area provides an excellent opportunity for marine biological study. The Marine Laboratory is an interdepartmental teaching and research facility of the University. The departments which are chiefly concerned are biochemistry, botany, chemistry, geology, physiology, and zoology. Academic programs include a spring term and a fall term for undergraduates and three terms of summer school for undergraduate and graduate students as well as a cooperative academic program for students from several colleges and universities. For information concerning application and registration, write to Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Agreements with Other Universities

Neighboring Universities. Under a plan of cooperation, the interinstitutional agreement among Duke University and the University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and North Carolina Central University in Durham, a student regularly enrolled in Duke University and paying full fees may enroll for one approved course each semester at one of the institutions in the cooperative program. If the student takes two or more courses during a summer at Duke, one of the courses may be taken at one of the neighboring institutions under this plan. This agreement does not apply to contract programs such as the American Dance Festival.

Approval forms for courses to be taken at these neighboring institutions may be obtained from the offices of the academic deans at Duke. Ordinarily, only those courses not offered at Duke will be approved. Credit so earned is not defined as transfer credit since grades in courses taken under the interinstitutional agreement are entered on the official record and used in determining the quality point ratio. The student pays any special fees required of students at the host institution and provides transportation.

Howard University. Duke students participating in the Duke/Howard University Exchange Program may spend a semester studying at Howard University in Washington, DC, while Howard undergraduates enroll for the same period at Duke. More information about this program, administered by Trinity College, is available at 2022 Campus Drive.

Continuing Education

Academic Study. Local adult residents are encouraged to pursue academic study at Duke (1) as provisional degree candidates for those resuming or beginning a bachelor's degree; (2) as nondegree students, for those seeking a sequence of undergraduate credit courses; and (3) as students completing the last year of work towards a degree at another institution. These students are given academic and career counseling by the Office of Continuing Education. They are subject to most of the regulations set forth for degree candidates. Continuing education applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office,

accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

Adult Counseling Services. Adult Counseling Services assists persons making decisions about returning to work, re-entering school, career planning and assessment, life/work transitions, and individual goal setting. Individual appointments, group sessions, and workshops are held.

Short Courses and Conferences. Short courses (noncredit) in the liberal arts are offered regularly throughout the year for those interested in building personal skills and career advancement.

Conferences, institutes, and training programs are conducted during the academic year and in the summer. Some are residential and others are designed for local participants. Some award continuing education units.

The Institute for Learning in Retirement. The institute is for persons over fifty years of age who recognize in themselves a need to continue learning and sharing knowledge.

For brochures on each program and for fuller information, write or call the Office of Continuing Education, The Bishop's House, East Campus, (919) 684-6259.

Reserve Officer Training Corps

Duke University and the military services cooperate in offering officer education programs to provide opportunities for students to earn a commission in the United States Air Force, Army, Navy, or Marine Corps. The programs are described below, and detailed information on scholarships, entrance requirements, and commissioning requirements is available from the offices of the Department of Air Force Aerospace Studies, the Department of Military Science, and the Department of Naval Science. Courses offered in these departments are described in the chapter "Courses of Instruction" in this bulletin.

The Air Force Reserve Officer Training Corps (AFROTC). AFROTC selects, trains, and commissions college men and women to serve as officers in the U.S. Air Force. Two AFROTC programs are available, a four-year and a two-year program.

The four-year program consists of the General Military Course (GMC) taken during the freshman and sophomore years and the Professional Officer Course (POC) taken during the junior and senior years. Entry into the GMC is open to all freshmen and sophomores. Entry into the POC is competitive and requires successful completion of a four-week field-training encampment at a selected Air Force base during the summer between the sophomore and junior years.

Students interested in the two-year program should submit applications no later than the spring semester of their sophomore year. Entry into the two-year program is competitive and requires the successful completion of a six-week summer field-training encampment prior to entry.

Cadets may compete for three and one-half-, three-, two and one-half-, and two-year scholarships. All scholarship and POC cadets receive a tax-free stipend of \$100 per month. On graduation, cadets are commissioned as second lieutenants in the Air Force Reserve and are obligated to serve four years of active duty. Direct inquiries to the Department of Aerospace Studies, 304 North Building, (919) 684-3641.

The Army Reserve Officer Training Corps (Army ROTC). Army ROTC provides students with an opportunity to earn a commission as a second lieutenant in the U.S. Army, U.S. Army Reserve, or Army National Guard while completing requirements for a baccalaureate degree. Two programs are available, a four-year and a two-year program.

The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). Direct entry into the Advanced Course is possible under specific circumstances (two-year program). Students wishing to join the two-year program must confer with the Department of Military Science not later than April 1 of their sophomore year. There is a mandatory summer training requirement, Advanced Camp, which takes place over a six-week period between the junior and senior years.

Upon commissioning, the service obligation may be served as active duty, in the Army Reserve, or in the Army National Guard, as directed by the Secretary of the Army. At the beginning of the senior year, cadets submit a preference statement concerning the method in which they wish to fulfill their service obligation and the specialty in which they desire to serve. A request to delay the fulfillment of the service obligation in order to attend graduate or professional schooling is also authorized.

Cadets are encouraged to compete for Army ROTC scholarships which pay full tuition, most fees, a generous textbook and equipment allowance, and \$100 per month (up to \$1,000 per year) for each month in school. Nonscholarship advanced course cadets also receive the \$100 monthly stipend. All of the above benefits are tax-free. Advanced Camp attendees are paid one-half of the basic pay of a second lieutenant.

Detailed information is available from the Department of Military Science, 06 West Duke Building, East Campus, (919) 684-5895.

The Naval Reserve Officer Training Corps (NROTC). The Department of Naval Science offers students the opportunity to become naval officers upon graduation. Selected students may receive up to four years of tuition, fees, uniforms, and textbooks at government expense under the auspices of the Scholarship Program. In addition, scholarship students receive subsistence pay and summer active duty pay of approximately \$1,300 a year. They participate in training courses each summer either aboard ship or at naval shore facilities to augment their academic studies. Four years of active duty service as a Regular Officer is required upon graduation.

Nonscholarship students may be enrolled in the College Program. They take the same courses and wear the same uniform, but attend the University at their own expense. Uniforms and naval science textbooks are provided by the government. During the last two academic years, they are enlisted in the Naval Reserve, receive \$100 per month subsistence pay, and participate in summer training. Three years active duty service as a Reserve Officer is required upon graduation.

College Program students may compete for scholarship status during the freshman or sophomore years through academic performance, demonstrated aptitude for military service, and nomination by the Professor of Naval Science. Students in either program may qualify for a commission in the Marine Corps through the Marine Corps Option Program. Students seeking further information on the NROTC program may call the Department of Naval Science, 416 North Building, (919) 684-3841.

Precollege Program

During the summer of 1985, Duke University will offer a Term II program for rising high school seniors from across the country. The Precollege Program is designed to provide the academic challenge of excellent college-level courses to qualified college-bound students and to help prepare them for the adjustments they will be making when they enter college as freshmen. Students will enroll in two regular Summer Session classes with Duke undergraduates. Introductory level courses in the humanities, social sciences, natural sciences, and languages will be offered for college credit and there will be a wide range of campus programs and activities available as well. The students will live in supervised, air-conditioned University dormitories, eat their meals in the University dining halls, enjoy the opportunity of studying with distinguished members of the Duke faculty, and will have access to all University libraries

and athletic facilities. Special programs organized by the residential staff will include sessions on such topics as research and study skills, communicative skills, health and physical fitness, selection of careers and colleges, and interpersonal relationships. For further information, contact the Precollege Program, 01 West Duke Building, Duke University, Durham, North Carolina 27708.

Duke Summer Festival of Creative Arts

The Duke Summer Festival of Creative Arts is part of the summer session and an extension of the function of the Office of Cultural Affairs, coordinating the arts in the summer and providing an exciting, artistically stimulating environment for the campus and community. During the summer, it is possible to offer new and innovative courses and workshops. Distinguished artists and scholars will be involved in cocurricular sessions. Students will have the opportunity to try their wings in formal and informal productions.

Specific course listings can be found under drama, music, and dance. The range of fees and other information may be obtained by writing the Office of the Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706.

Summer Drama Program. The Duke University Drama Program, which began its course offerings in the summer of 1974, strives to make its summer program particularly exciting and innovative. The course offerings, listed in this bulletin under drama, and the production program of Summer Theatre at Duke offer the theater-oriented student an integrated program of training in practical theater and dramatic literature during the first and second summer terms.

Detailed information on faculty, courses, productions, and auditions may be obtained by writing to Summer Drama Program, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

Summer Theatre at Duke. Founded in 1972, Summer Theatre at Duke has become an eagerly awaited series of exciting theatrical events. The repertory is chosen from the best in modern theater and musical comedy with an occasional new look at a classic. The casts are selected on the basis of auditions held during late spring. Four professional guest artists will headline casts of students and local talent. Direction and design are provided by the professional staff of the Duke University Drama Program.

For its fourteenth season, Summer Theatre at Duke will offer three major productions and several special events during June and July, 1985. The repertory and ticket information will be announced in late spring. For further information, write to Summer Theatre, Duke University, Box 6841 College Station, Durham, North Carolina 27708.

The American Dance Festival. The six-week program offers a wide variety of classes, performances, and workshops. For a catalog, write to the American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

Campus Life and Activities



Student Affairs

The Division of Student Affairs strives to complement the educational mission of the University by helping to relate many of the nonacademic components of the University to the academic experiences of the students. The residence halls, the athletic fields, the Chapel, and many student organizations play an important humanistic and holistic role in the students' university experience by developing leadership qualities, skills in interpersonal relationships, and appreciation for the care of the physical self. Thus, the university experience encompasses collectively the life of the mind, body, emotions, and, indeed, the spirit.

Residential Life

Duke has a long tradition as a residential university and has sought to provide convenient housing for the majority of the undergraduate students. While the University was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

While freshmen are required to live in the University residence halls, a number of upperclassmen choose to live off campus. Students enrolled beyond their fourth year of the undergraduate program cannot be granted space in University housing. Transfer students, part-time students, and former students who have been readmitted are not eligible for on-campus housing.

Residence Halls and Apartments. The University accommodates 85 percent of its undergraduates in fifty-nine residence hall living groups located on East, West, and North Campuses and in apartments located on Central Campus. Within one of the residence halls on East Campus, there is an International Living Group which is cosponsored by International House, as well as languages corridors for students interested in speaking French, Spanish, and German.

University housing is considered to include residence hall space as well as Central Campus Apartments. Placement in any of these areas fulfills the University's obligation to house eligible students in University housing.

Freshmen reside in all-freshman houses clustered on the three campuses; upperclass students reside not only in all-upperclass residence halls but also in Central Campus Apartments. Residential fraternities are housed in sections of upperclass residence halls; by tradition, sororities are not residential. Freshman housing assign-

ments are made by lottery to the houses in the freshman clusters while upperclass housing assignments are made by a combination of lottery and student choice.

Living groups elect officers and organize social, intramural, and cocurricular programs, and community service projects. All of the residence halls have resident advisers who live in the houses and are members of the staff of the Dean for Residential Life. These graduate and undergraduate students have broad responsibilities in the residential life of the University including counseling students with personal problems, advising the house governments, and serving as resource persons for students.

Residence Hall Programming. Academic, cultural, and cocurricular programming is planned and presented throughout the year in the residence halls through the cooperative work of the Office of Residential Life, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are a number of faculty members in residence in both freshman and upperclass houses. Faculty offices and seminar rooms are also located in several of the freshman houses. The goals of these various residential programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside of the formal classroom, and to develop a greater sense of community within the individual residence halls as well as within the greater University.

Living Off Campus. The option of living off campus is available for upperclass students, and those who choose it may retain their resident status and eligibility for University housing if they follow the proper procedures as published by the Office of Residential Life.

Dining Facilities

All students living in campus residence halls are required to participate in one of five meal plan options. Off-campus students may participate in any of these plans or a special off-campus offering. Duke University meal plans offer students the flexibility of using their plans in "unlimited seconds" cafeterias, snack bars, and restaurants with deli and grilled sandwiches, Mexican food, salad bars, and other specialities.

Duke University Food Services (DUFS) facilities on East Campus include the East Court cafeteria in the East Union; the Dope Shop (a snack bar); and the DownUnder (located in Gilbert-Addoms dormitory), an a la carte restaurant featuring Mexican food, sandwiches, and snacks. The West Union dining facilities on West Campus include the University Room, an a la carte cafeteria; the Blue and White Room cafeteria; the Oak Room, a table service and menu restaurant; the Leaf 'n' Ladle soup and salad bar; and the Cambridge Inn, a deli, grill, and convenience foods shop. The Boyd-Pishko Cafe and the Terrace Cafe in the Bryan University Center also serve the West Campus. The Boyd-Pishko Cafe serves breakfast items, grilled sandwiches, and snacks. Gourmet hamburgers, deli sandwiches, and salads are featured at the Terrace Cafe. On the North Campus, Trent Drive Hall has a cafeteria; the Sprout, a soup and salad bar; and Gradel's, a New York-style delicatessen and grill. In addition, DUFS operates Pizza Devil, a pizza take-out and delivery service. There is a full range of catering services available to all students.

Religious Life

Two symbols indicate how important religion has been to this University since its founding: *Eruditio et Religio*, the motto on the seal of the University, and the location of the Duke Chapel at the center of the campus. People from all segments of the University and the community gather in Duke Chapel on Sunday morning to worship in a service which offers excellent liturgy, music, and preaching. The world's outstanding Christian preachers have preached from the Duke Chapel pulpit.

The University ministers work with the campus ministers and staff from the Roman Catholic, Jewish, and Protestant communities, and with other groups to provide a ministry which is responsive to the plurality of religious interests on the campus.

Through the religious life of the University, students are encouraged to search for meaning, to ask the ultimate questions, to worship, to meditate in the beautiful chapel, to learn from outstanding theologians from a wide array of traditions, and to work to bring about a more just and humane society.

Services Available

Student Health Service. The objective of the Student Health Service is to provide medical care and advice to students. Both the Student Health Services Clinic and the University Infirmary are available to students for that purpose. A separate fee for this service is assessed.

The facilities of the Student Health Clinic are open during both regular and summer sessions to all currently enrolled full-time undergraduate students, as well as to regularly enrolled students in the graduate and professional schools. For treatment of illnesses or injuries, students should first visit the Student Health Clinic. The campus bus makes regular trips to the clinic, and emergency transportation can be obtained from the Duke public safety officers or from ambulance services in Durham. Residential staff personnel should be consulted, whenever possible, for assistance in obtaining emergency treatment. For a description of the specific services provided by the clinic and also by the infirmary, see the *Bulletin of Duke University: Information and Regulations*.

The Health Education Staff, located within the student health facility, is available to work with students in making informed decisions that lead to healthy lifestyles at Duke and beyond. Specific areas of concern and interest include alcohol and other drug usage, eating and nutrition, sexual activity, and stress management. Programs, meetings, and consultations are provided for both groups and individuals.

In addition to the Student Health Service, the University makes available a plan of accident and sickness insurance to cover students who are enrolled in the University. This plan is designed to complement services normally not accessible to students through the Student Health Service coverage; it covers students both on and off campus, at home, or while traveling between home and school during the interim vacation periods throughout the one-year term of the policy.

All full-time and part-time degree candidates are required to enroll in the student accident and sickness insurance policy, made available by the University, unless they show evidence by completing the appropriate waiver statement contained on the remittance form of the University invoice indicating that they are covered by other generally comparable insurance. This statement requires that the name of the insurance company and the policy number be indicated as well as the signature of the student or parent. Also, this requirement may be waived by signing the appropriate space on the University invoice indicating a willingness to assume the medical costs of any sickness or accident.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) provides a coordinated, comprehensive range of counseling and developmental services to assist and promote the personal growth of Duke students. The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide evaluation and brief counseling/psychotherapy regarding a wide range of concerns, including such issues as self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. Career counseling is also provided and a career library with sources of occupational and educational information is maintained. While stu-

dents' visits with counselors are usually by appointment, a walk-in consultation service is provided two hours each weekday for students with urgent personal concerns.

Each year CAPS offers a series of self-development seminars focusing on skills development and special interests. Topics of previous seminars have included career planning, stress management, social development, communication enhancement, and understanding problems that surround eating.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admission tests and professional licensure and certification examinations. The staff is also available to the entire University community for consultation and educational activities in student development and mental health issues affecting not only individual students but the campus community as a whole. They work with campus personnel, including administrators, faculty, student health staff, religious life staff, resident advisers, and student groups, in meeting needs identified through such liaisons. Staff members are also available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If a student desires that information be released to anyone, written authorization must be given by the student for such release. Initial evaluation and brief counseling/therapy as well as career and skills development seminars are covered by the student health fee. There are no additional costs for these services.

For additional information, see the *Bulletin of Duke University: Information and Regulations*, or call (919) 684-5100.

Office of Placement Services. The Office of Placement Services is the liaison between the University community and potential employers in business, education, nonprofit organizations, and government. The purposes of the office are to give Duke students opportunities to investigate career options prior to beginning the placement process and to assist seniors in identifying employment opportunities commensurate with their qualifications, interests, and desires. An extensive file of openings for permanent, part-time, and summer employment is available, as is a library of general information about careers, employers, and graduate schools. Staff members are available to discuss career plans; permanent, summer, and part-time employment opportunities; interviewing techniques; and other related matters.

Seniors and graduate students who are nearing the completion of a degree and are interested in interviews with representatives from business and industry, government agencies, and graduate and professional schools should complete the registration forms in the office in early September. Employer and graduate and professional school representatives visit Duke beginning October 1.

Part-time Employment. A listing of a wide variety of part-time job opportunities on campus and in the Durham area is maintained in the office. All students interested in working during the school year should register at the beginning of the semester. Every effort will be made to help students find jobs consistent with their career interests.

Summer Employment. A file of contacts for summer employment is maintained in the office, and some representatives conduct interviews on campus for these positions. Students interested in summer jobs should contact the office in early October.

Career Counseling. Preliminary exploration of career interests early in the student's academic career is possible through the Career Apprenticeship Program, which offers nonpaid experience in a variety of career fields. This program gives the student the opportunity to gain practical work experience and to broaden the educational experience by related field work during the undergraduate years. Students may also use the Duke Network file to identify Duke alumni, representing a variety of career fields, who have agreed to talk with undergraduates about various career paths.

Office of Minority Affairs. The Office of Minority Affairs (OMA) is an interdisciplinary/student service component of the University which assists minority students in their adjustment to student life. The office has designed and implemented a variety of programs which are aimed at maximizing students' potential for realizing their academic goals. Three major program components are included in these efforts:

Summer Transitional Program (STP). This program introduces selected precollege students to academic and student life at Duke. Courses in English, mathematics, and study skills are offered to incoming freshman students during the summer preceding matriculation. Individual, group, and peer counseling sessions in STP present students with the opportunity to exchange ideas regarding individual and group concerns. STP students are housed together on West Campus.

Counseling in Academic and Social Affairs (CASA). CASA provides the ongoing leadership of a graduate counselor to each undergraduate student. The counselors visit with students on a regular basis, hold group discussions, and serve as sources of information and referral to all students.

Tutoring Program. This program maintains tutors in mathematics and chemistry on a regular basis for any student seeking assistance. Although many students come to the tutoring program through supportive academic personnel, most are self-referred. Tutoring is encouraged and should be arranged as soon as a need is perceived.

Offices for Program Planning

The University Union. The University Union brings all campus segments together through a broad program of lectures, concerts, performing arts, exhibits, games, festivals, crafts, special events, dances, and film and video presentations and productions. Other union activities range from facilities management to general information services.

The union is located in the Bryan University Center, which is the hub of cultural, social, recreational, cocurricular, and service activities for students and other members of the campus community. The Bryan Center also houses the University stores, a cafe, a snack bar, three first-rate theaters, a post office, bank services, an art gallery, meeting rooms, offices for student organizations, an information center, a ballroom, a crafts center, a games room, a mall, lounges, and other facilities.

Office of Student Life. The Office of Student Life develops and coordinates the new student orientation programs for freshmen and transfer students and works closely with the Freshman Advisory Council (FAC), which is composed of upperclass men and women who are selected for qualities of responsibility and leadership. The members of the Freshman Advisory Council are each assigned a small group of freshmen. During Orientation Week, they welcome their new students and introduce them to the University; during the first semester, they continue their relationship with their freshmen, helping them make the many adjustments to university life. The office also works with entering transfer students and the Transfer Advisory Committee.

Other responsibilities of this office include coordinating the application of the general rules and regulations of the University, advising the participants in the judicial process, serving as a resource center for handicapped students, advising the Interfraternity and Panhellenic Councils, and acting as a liaison with both the Student Health Service and the Department of Public Safety.

Office of Student Activities. The Office of Student Activities, located in the Bryan Center, is a resource for approximately three hundred University clubs and organizations and provides a congenial atmosphere for club work with telephones, typewriters, table spaces, and publicity supplies available free of charge. There is also a copy service for the convenience of student groups and information about room reservation policies, film showings, office space, and campus funding sources.

The director and program associates are available for advice in planning events, for guidance in establishing new groups, and for information about activities of campus groups. The financial manager oversees the financial affairs of student groups, Greek organizations, and residential living units. This includes processing their financial and payroll transactions, auditing their financial accounts, offering bookkeeping budgeting and fundraising workshops for treasurers, and providing financial advice on an ongoing basis.

Workshops and other program aids to foster leadership and organizational skills among student leaders are presented throughout the year. Also, the office sponsors an annual Student Activities Day, coordinates Duke's participation in the Share Your Christmas programs, and participates actively in Black Student Weekend.

Office of Cultural Affairs. The Office of Cultural Affairs is responsible for the creation, coordination, and implementation of many of the cultural and popular programs which occur on campus. The office is directly responsible for the Duke Artists Series; Quadrangle Pictures (35mm film program); Artsfare, The Summer Festival of Creative Arts; and the scheduling of Page Auditorium, as well as all campus activities. With the exception of athletic events, all campus entertainment programs which require tickets are handled by Page Box Office, an extension of the Office of Cultural Affairs. In addition to overseeing arts-related activities, this office is responsible for publishing and distributing the yearly and weekly editions of the *Duke University Calendar*.

The Mary Lou Williams Center for Black Culture. The Mary Lou Williams Center for Black Culture was dedicated in September, 1983, in memory of the "great lady of jazz" and former artist-in-residence whose name it bears. The culmination of the work and dreams of many people, the center exists to promote and preserve black expressive culture at Duke. It serves as a gathering place for black students, where they can learn more about the beauty and richness of their culture and can with pride share their heritage with other students and members of the Duke community in an atmosphere of racial harmony.

The center is composed of the director's office, two lounge areas, a library, an art gallery, and a large meeting area. This is not only the site of a variety of programs planned by the director and the black students but it can also be reserved by other groups on campus.

International House. International House is the center of cocurricular programs for the more than three hundred students from seventy-two countries, as well as for American students who are interested in other cultures, are considering study abroad (see the section on study abroad in the chapter "Special Programs"), or are planning to travel outside the United States. The International Association, which includes a significant number of American members, plans social and cultural programs which emphasize personal contact and informal exchange of ideas among students from diverse backgrounds. Included are weekly open-houses with lectures, films, pot-luck dinners, or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area.

Programs which assist students from abroad in participating in the life of the Duke and Durham communities include an intensive orientation program at the beginning of the academic year; the Host Family Program, in which interested international students may become acquainted with American families; and the Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community.

International House is cosponsor, with the Office of Residential Life, of the International Living Group, which enables students with a strong international in-

terest to pursue that interest in a residential setting. (See the section on residential life in this chapter.)

The Director of International House also serves as International Adviser. The director and an assistant work with students from abroad in fulfilling the various immigration and tax formalities involved in coming to Duke. Their office is located on the second floor of International House.

Further information may be obtained from International House, 2022 Campus Drive, (919) 684-3585.

Student Organizations

Associated Students of Duke University. The Associated Students of Duke University (ASDU) is responsible for articulating undergraduate student thought on issues relevant to the University and for working to improve the educational process and University environment. The working philosophy of ASDU is that students have the right to participate in the University's decision-making process on matters that directly affect the student body.

The Executive Committee is responsible for the implementation of all legislative action and for the coordination of the organization. It consists of the President, four Vice-Presidents (Executive, Student Affairs, Academic Affairs, and Engineering), an Executive Secretary, an Administrative Secretary, and additional members appointed by the President.

The ASDU legislature is composed of representatives from each undergraduate living group on campus, representatives of students living off campus and on Central Campus, and representatives selected from the entire student body. Within the legislative branch, there are four committees (Academic Affairs, Student Affairs, External Affairs, and Buildings and Grounds) which initiate legislation and projects to benefit the student body. Another legislative committee, the Student Organizations Committee, is responsible for allocating the student activities fee paid by each undergraduate to various chartered clubs and organizations.

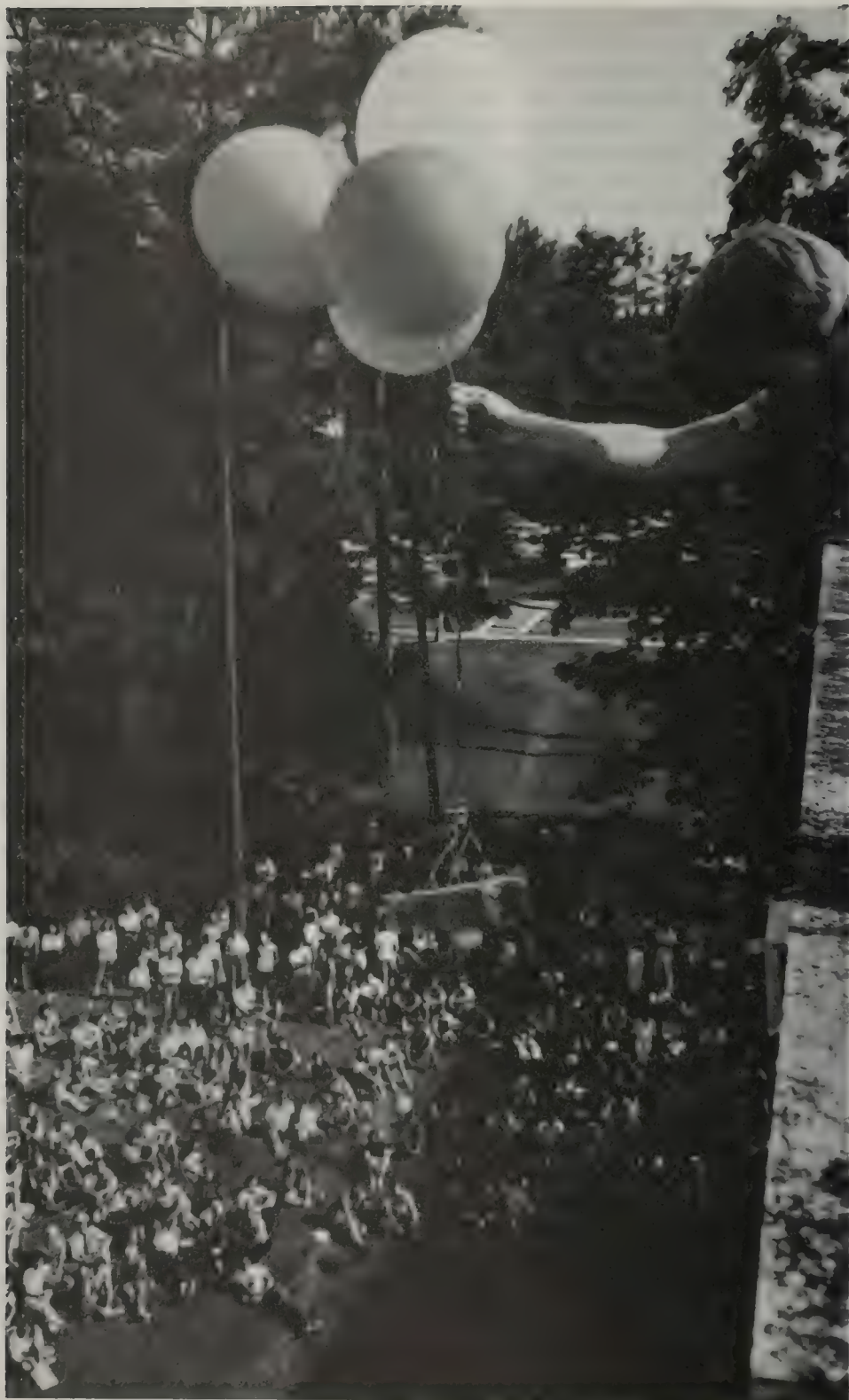
ASDU provides several services that directly benefit the student body. They include a legal assistance program, voter-registration drives, a file of typists, a maternity and abortion loan fund, a ride/rider board, a student check cashing service, and a peer course counseling night.

Cultural and Social Organizations. The scope of the more than three hundred student organizations is suggested by a partial listing of their names: Alpha Phi Omega service fraternity, Black Student Alliance, Baptist Student Union, Cheerleaders, International Association, Duke Ice Hockey, Outing Club, Sailing Club, Association of Duke Women, Model United Nations Club, Photography Group, and the N.C. Public Interest Research Group. Twenty national social fraternities and thirteen national sororities are represented on campus. They are governed by the Interfraternity and Panhellenic Councils, respectively.

Many opportunities are provided on campus in the areas of music and drama. The Chorale, Modern Black Mass Choir, Chapel Choir, Wind Symphony, Marching Band, Symphony Orchestra, and Collegium Musicum are examples of musical organizations. Duke Players perform established and experimental drama; Hoof 'n' Horn presents musical comedy; Karamu performs drama related to the black experience.

Several academic departments sponsor organizations and programs for students with special academic or professional interests. There are over twenty academic department majors unions on campus. There are also academic and leadership honorary societies.

Media. The *Duke Chronicle*, the campus newspaper, publishes five issues weekly and is governed by the Chronicle Board. A humor magazine (*Jabberwocky*), a literary



magazine (the *Archive*), a calendar/topical magazine (*The Missing Link*), and a feature magazine (*Tobacco Road*) are published on a regular basis by students. In addition, a *Teacher-Course Evaluation Book*; a photography magazine, *Latent Image*; a comprehensive yearbook, the *Chanticleer*; and *Duke Humanities Review* are produced each year. These publications are under the direction of the Publications Board, which chooses the editors and business managers and reviews and approves the financial budgets of all such franchised publications. WXDU-FM is the student-managed and programmed radio station, broadcasting to the Duke and Durham communities. Duke Union Community Television (Cable 13) is operated by students and produces color television programs that are broadcast throughout the campus on the University cable system. The *DukEngineer*, the official student magazine of the School of Engineering, appears twice each year and contains articles on technical and semitechnical topics as well as other matters of interest to the school.

Project WILD. Project WILD (Wilderness Initiatives for Learning at Duke) is a unique student organization which, through the ideal of experiential education (learning through doing), tries to ease the transition period into college for Duke students. Run totally by students, the program strives to teach self-worth, group awareness, and an appreciation of nature. WILD, a ten-day course held prior to Orientation Week, runs both biking and backpacking crews through the North Carolina mountains. In addition to this August course, WILD also sponsors activities including weekend trips, house courses, Christmas and May wilderness courses, and a New Games festival for all students.

Health, Physical Education, and Recreation

Besides offering a variety of classes (see the chapter "Courses of Instruction"), the Department of Health, Physical Education, and Recreation also sponsors numerous programs for all students in intramurals, sports clubs, and recreation.

The Intramural Sports Program provides an opportunity for every student to participate in organized recreation competition in forty-six activities. The program is comprised of three major areas: men's intramurals, women's intramurals, and co-rec intramurals. It is open to all graduate and undergraduate students as well as to faculty and staff of Duke University. Participation, not skill, is a major factor that is emphasized in the program.

More than thirty-three sports clubs have been chartered by Duke students for those with similar interests to participate in competition and recreational activities. Clubs vary from those which compete with clubs of other universities, such as soccer, rugby, and ice hockey, to those of a more recreational nature such as cycling, scuba diving, and sailing, and one which yearly presents several performances, the water ballet club.

The University's many recreational facilities, available to all students, include the championship Robert Trent Jones Golf Course, tennis courts (some lighted) on both campuses, swimming pools on both campuses, three gymnasiums, a weight training room, squash and racquetball courts, outdoor handball and basketball courts, an archery range, horseshoe courts, an all-weather track, and numerous playing fields, jogging trails, and informal recreational areas. Tournaments in recreational sports are often organized and conducted by students. Students may reserve facilities and equipment at designated times.

Intercollegiate Athletics

The Athletic Department fosters intercollegiate athletics by striving for excellence and by providing the best possible framework within which highly accomplished student athletes can compete. The department has a dual responsibility to provide a

high-quality athletic program and environment so that all students have the opportunity to compete to the fullest extent of their abilities. Duke is a member of the National Collegiate Athletic Association and the Atlantic Coast Conference (ACC). The ACC consists of Clemson, Duke, Georgia Tech, Maryland, North Carolina at Chapel Hill, North Carolina State, Virginia, and Wake Forest.

The intercollegiate program for men includes football, cross-country, soccer, basketball, swimming, fencing, wrestling, indoor and outdoor track, baseball, golf, tennis, and lacrosse. The women's athletic program provides intercollegiate competition in basketball, fencing, field hockey, golf, swimming, tennis, volleyball, indoor and outdoor track, and cross country. Freshmen may participate on all varsity teams.

The Director of Athletics and the Associate and Assistant Directors of Athletics provide departmental leadership and coordinate all athletic policies with the University Athletic Council. The council consists of representatives from the undergraduate student body, the faculty, the administrative staff, the trustees, and the alumni. The council meets with the Director of Athletics periodically during the school year. The chairman of the council is the official University representative at national and conference athletic meetings.

The Duke Student Honor Commitment

At the initiation of the President of the University in 1978, Terry Sanford, the members of the Class of 1982 proposed "The Duke Student Honor Commitment." Different from and in addition to the Judicial Code, the Honor Commitment is a personal commitment of honor and integrity which is self imposed and not enforced by an outside authority.

Following is a copy of this commitment which every new student to Duke receives:

A unique aspect of a liberal education is its attempt to instill in the student a sense of honor and high principles that extends beyond academics. An essential feature of Duke University is its commitment to an atmosphere of integrity and ethical conduct. As a student of Duke University I accept as my personal responsibility the vigorous maintenance of high standards of honesty, truth, fairness, civility, and concern for others.

My devotion to integrity establishes that I will not cheat in academic work, and that I will adhere to the established and required community code of conduct. According to the dictates of my own conscience, I will report behavior in violation of such established standards. In addition and beyond the requirements of any code or law, I confirm my own commitment to personal honor and integrity in all matters large and small. Even though the ideal of honor is an abstract one, by implementing this ideal, I join the men and women of Duke University in making the concept of honor a reality.

Judicial System and Regulations

Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University currently in effect, or which are put into effect from time to time by the appropriate authorities of the University. At the same time, the individual is responsible for decisions and choices within the framework of the regulations of the community, as Duke does not assume *in loco parentis* relationships.

Students, in accepting admission, indicate their willingness to subscribe to and be governed by these rules and regulations. They acknowledge the right of the University to take disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the University.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University and, by delegation, with administrative officers of the University. In the undergraduate schools,

and in the University as a whole, many of these rules have been established over the years by cooperative action between students, faculty, and administrative officers. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated proposals for policies and rules necessary to assure satisfactory standards in academic and nonacademic conduct. These proposals have been accepted by University officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke. For current regulations, refer to the *Bulletin of Duke University: Information and Regulations*.

Students in Trinity College of Arts and Sciences and in the School of Engineering constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and of certain University regulations are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the board, the Judicial Code of the Undergraduate Community, the procedural safeguards, and rights of appeal guaranteed to students are published in the *Bulletin of Duke University: Information and Regulations* for the undergraduate community. As provided in the judicial structure of the University, each residential unit may have a judicial board which has jurisdiction over all offenses involving violations of regulations relating to dormitory procedures and social regulations not covered by the undergraduate community code or University policies and regulations. The Residential Judicial Board may function as an appellate body in cases involving appeals from the individual house judicial boards and has original jurisdiction in disputes involving two or more dormitories. For further information, refer to the *Bulletin of Duke University: Information and Regulations*.

Student Discrimination Grievance Procedures

The Duke University policy on nondiscrimination is set forth on the credits page of this bulletin. Procedures for investigation and remedy of any complaint and for appeal of any decision are detailed in the *Bulletin of Duke University: Information and Regulations*.

Student Obligations and Requirements

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

Admission



Principles of Selection

James B. Duke, in his Indenture of Trust, requested that "great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination, and application evincing a wholesome and real ambition for life." In this light, and in view of the institution's limited enrollment, Duke University looks beyond the basic characteristics of academic competence possessed by the majority of applicants. It seeks, in each prospective student, regardless of race, sex, color, religion, handicap, or national origin, not only evidence of intellectual promise and maturity of judgment, but also a degree of positive energy. Often, this energy is expressed in the form of special talents and accomplishments; it is seen consistently in a student's determination to make creative use of the opportunities and challenges posed by Duke University.

Requirements for Application

As there are occasionally changes in admission policies or procedures after the printing deadline for the *Bulletin of Duke University: Undergraduate Instruction*, candidates are urged to consult the *Bulletin of Duke University: Information for Prospective Students* for specific admissions information, dates, and policies.

DEGREE STATUS

Although there are no inflexible requirements as to subject matter, students are urged to choose a broad and challenging high school program. At least twelve units of acceptable college preparatory work must be presented for review. Applicants to the School of Engineering are advised to take four units of mathematics and at least one unit of physics or chemistry.

The Scholastic Aptitude Test (SAT), given by the College Board, and three Achievement Tests (one of which must be English Composition, with or without essay) are required of all candidates for freshman admission and must be taken by December for February Notification and by January for April Notification. Since placement in foreign language study and fulfillment of the foreign language requirement can be determined by an Achievement Test score, it is recommended that a candidate who has studied a foreign language take the Achievement Test in that language. Candidates may submit results of the American College Testing Program (ACT) in lieu of SAT and Achievement Test scores, provided the test is taken by December of the senior year; the scores must be made available to the Admissions Committee thirty days before the decision date. Candidates for the School of Engineering who elect to

take the College Board test battery are required to take an Achievement Test in mathematics, either level 1 or level 2.

NONDEGREE STATUS

Summer Session. Persons who are or were at the time of leaving their home institutions in good standing in accredited colleges or universities may be admitted for summer study only by the Director of the Summer Session.

Continuing Education. Admission as a nondegree student at Duke is limited to: people residing in the area who, because of family and work responsibilities, have no other access to education; Duke graduates of the preceding year; people who will be moving to the area and who will reside here for a substantial period of time; local high school students; and Duke University employees. These students are given academic and career counseling by the Office of Continuing Education; they are subject to most of the regulations set forth for degree candidates.

Application Procedures

DEGREE STATUS

A *Bulletin of Duke University: Information for Prospective Students*, which contains the first part of the application, may be obtained from the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706. A nonrefundable processing fee of \$35 must accompany the first part of the application.

A personal interview at Duke is not required for admission; students who find it possible to visit the campus, however, may write for an interview or participate in one of the group information sessions held during particularly busy periods. Interviews cannot be granted from January through April, when applications are under review.

April Notification. Candidates for admission to the freshman class must submit the first part of the application by December 15 and final applications no later than January 15 of their senior year in secondary school. Decisions are mailed from the University by April 15, and accepted candidates are expected to reserve a place in the class by May 1 with a nonrefundable deposit of \$330.

February Notification. Students who indicate on their applications that they wish to learn of their admissions decisions by February 1 of their senior year must submit the first part of the application by November 1 and observe a December 1 final application deadline. Results of the Scholastic Aptitude Test taken through November and Achievement Tests (or the ACT) taken through December may be submitted for review. Applicants for February Notification are permitted to apply concurrently to other colleges, although those who are accepted by Duke in February must pay the nonrefundable registration and room deposit fees of \$330 by February 15 to reserve a place in the class. Because neither of the two notification dates is intended to be more competitive than the other, students who receive negative decisions in February will not have their applications reviewed again in April.

Midyear Admission. Midyear admission allows a limited number of freshmen to begin their college work a semester early or to postpone matriculation for a semester. Midyear applicants are expected to complete all the requirements for fall admission. The application deadline for new candidates is September 15 for the first part of the application and October 15 for the final application; students will be notified of the decision on their applications by November 15, with the expectation that those who are accepted will reply by December 1 with a nonrefundable deposit of \$330.

Transfer Admission. Transfer admission from other accredited institutions may be arranged for a limited number of students each semester. Because the transcript of

at least a full year of academic work is preferred by the Admissions Committee, and because transfer students are required to spend their last two years at Duke, most candidates apply to Duke during their third or fourth semester in college. Candidates submit official transcripts of all work completed at other accredited colleges, high school records, scores on the Scholastic Aptitude Test, and employment records if there has been an extended period of employment since graduation from secondary school, along with completed application forms. See the section on transfer credit in the chapter "Academic Procedures and Information."

All students admitted as transfers should expect to be responsible for their own off-campus housing arrangements for each academic term. Residence halls are available for summer occupancy only. The Office of Housing Management provides assistance to students who seek housing and/or roommates.

June (Term II, summer session) and September (fall semester) transfer students meet a March 1 deadline for the first part of the application and an April 1 final application deadline, learn of their decisions by May 15, and respond to the University by June 1 with a nonrefundable deposit of \$230. January transfer students submit the first part of the application by September 15 and final applications by October 15, learn of their decisions by November 15, and reply to the University by December 1.

NONDEGREE STATUS

Summer Session. Application forms and schedules of courses may be obtained by writing or calling the Office of the Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706; (919) 684-2621. No application fee is required.

Continuing Education. Applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office, accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

At least four courses must be completed successfully before a nondegree candidate may apply for degree candidacy. Students who plan to complete the four courses should not expect automatic admission to the University. More detailed information is available from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

READMISSION OF FORMER STUDENTS

A student who desires to return, following withdrawal from college, should apply to the appropriate college or school. (See the section on readmission procedures in the chapter "Academic Procedures and Information.") Students who have been withdrawn from the University for five or more years must submit a new application to the Office of Undergraduate Admissions.

Financial Information



Tuition and Fees

No college or university can honestly state that an education at the college level is inexpensive. Fees paid by students cover less than half the cost of their instruction and the operation of the University. Income from endowment and contributions from alumni and other concerned individuals meet the balance and assure each student the opportunity to pursue an education of unusually high quality.

Students are urged to give their attention first to the selection of institutions which meet their intellectual and personal needs, and then to the devising of a sound plan for meeting the cost of their education. This process will require an in-depth knowledge of both the University's financial aid program and the resources of the student's family. A brochure describing in detail the various forms of financial aid may be obtained from the Office of Undergraduate Financial Aid, Duke University, Durham, North Carolina 27706.

Estimated Expenses.* Certain basic expenditures, such as tuition, room, and board, are considered in preparing a student's budget. These necessary expenditures, with a reasonable amount allotted for miscellaneous items, are shown below:

	<i>Academic Year, 1985-86 (two semesters)</i>	<i>Two Summer Terms, 1985 (one semester equivalent)</i>
Tuition	\$8,270†	\$2,568-\$2,996
Residential Fee		
Single Room	\$1,753-\$2,300	\$884
Double Room	\$1,318-\$1,734	\$666
Food		
100% board plan	\$1,990	\$840
75% board plan	\$1,560	\$630
Books and Supplies	\$410	\$196
Student Health Fee	\$190	\$62

†For the School of Engineering, the tuition is \$8,870.

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. The average Duke student, however, can plan on a budget of approximately \$13,200 for the academic year.* The budget estimate for the summer (two terms, one semester equivalent) is \$4,725.* These budgets are all-inclusive except for travel costs and major clothing purchases.

Registration Fees and Deposits for Fall and Spring. On notification of acceptance, students are required to pay a nonrefundable first registration fee of \$30 and

*The figures contained in this section are projections and are subject to change.

to make a deposit of \$300. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$100 of the deposit serves as a continuing residential deposit for successive semesters, and the remaining \$200 serves as a continuing registration deposit.

Late Registration. Continuing students who fail to register during the registration period must pay a fee of \$25 to the Bursar.

ROTC Deposit. An Air Force ROTC deposit of \$10 is required of students enrolling in air science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

Part-Time Students. In the regular academic year students who register for not more than two courses in a semester are classified as part-time students. Part-time students will be charged at the following rates: one course, \$1,034 (\$1,109 for engineering courses); half course, \$517 (\$554.95 for engineering); quarter course, \$258.50 (\$277.25 for engineering). Registration for more than two courses requires payment of full tuition. Graduate students registered for undergraduate courses will be assessed three units for nonlaboratory courses and four units for laboratory courses. Men and women in nondegree programs who are being considered for admission to degree programs, as designated by the Office of Continuing Education, pay fees by the course whether the course load is one, two, or three courses.

Auditors. Auditing one or more courses without charge is allowed for students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for one or two courses may audit other courses by payment of \$103 (\$111 for engineering) for each course audited. With the consent of the appropriate instructor and the Director of Continuing Education, graduates of Duke may audit undergraduate courses for the above payment per course.

Payment of Accounts for Fall and Spring. The Office of the Bursar will issue invoices to registered students for tuition, fees, and other charges approximately four to six weeks prior to the beginning of classes each semester. The *total amount due* on the invoice is payable by the invoice due date which is normally one week prior to the beginning of classes. As part of the admission agreement to Duke University, a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. Nonregistered students will be required to make payment at the time of registration.

Tuition Prepayment Plan. Duke University offers undergraduate freshmen and their parents, who are not recipients of University-supported financial aid, the opportunity of paying four years of tuition prior to the start of the freshman academic year at the tuition rate of the upcoming academic year. Future tuition increases will not be passed along to participants for the duration of their plan. Questions regarding this plan may be directed to the Manager, Office of the Bursar, 101 Allen Building, (919) 684-3531.

Late Payment Charge. If the "Total Amount Due" on an invoice is not received by the invoice due date, the next invoice will reflect a penalty charge of 1-1/4% per month assessed on the past due balance regardless of the number of days past due. The "Past Due Balance" is defined as the previous balance less any payments and credits received on or before the due date and also any student loan memo credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default of this agreement if the *total amount due* on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a copy of the academic transcript, have academic credits certified, be granted a leave of absence, or

receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Tuition and Fees for Summer Session. Tuition for undergraduates is \$642 for each nonlaboratory or 3 semester hour (s.h.) course, \$856 for each laboratory or 4 s.h. course, \$428 for each half course (2 s.h.), and \$1,284 for each one and one-half course program (6 s.h.) offered at the Marine Laboratory.

Tuition for graduate students taking an undergraduate course is as indicated above.

Health Fee. All Duke students and all full-time non-Duke students are required to pay \$31 per term. All students at the Marine Laboratory are required to pay \$25 per five-week registration period.

Scuba Diving Fee. A fee of \$50 will be charged for each scuba diving class.

Studio Fee. A fee of \$40 will be charged for each studio art class.

Auditing Fees. With permission of the instructor and the Director of the Summer Session, students registered for a full course program (two courses) may audit non-laboratory courses except physical education and dance activity courses, studio art courses, and applied music courses. No extra charge is made.

Students carrying less than a full course program may be granted permission by the instructor and the Director of the Summer Session to audit a course (the above exceptions apply) but must pay half the University fee for the course.

Payment of Tuition and Fees. The University does not mail statements for summer session tuition and fees. All tuition and fees should be paid in the Office of the Bursar (101 Allen Building) at least five full working days prior to the first day of class (see summer session calendar). Students registering by mail may forward payment to the Office of the Bursar, 101 Allen Building, Duke University, Durham, North Carolina 27706. Failure to pay tuition and fees by the end of the drop/add period will result in administrative withdrawal of the student (see the section on refunds and withdrawal charges concerning penalties in this chapter). Students who have been withdrawn may not attend class or subsequently be registered for the term. Students who are unable to meet these deadlines should consult with the Bursar prior to the deadline.

Late Fee. Students who fail to register and pay all tuition and fees before five full working days prior to the first scheduled class day of a given course will pay an extra charge of \$25.

Transcripts. Requests for transcripts of academic records should be directed to the Associate Registrar. Ten days should be allowed for processing. A fee of \$1, payable in advance, is charged for each copy.

Duke Employees. Employees may request through the Office of Continuing Education permission to take for credit or audit up to two courses during any one semester or one during a summer term. Permission may be granted based on the individual merits and circumstances of each application. A formal application must be submitted by December 1 for the spring semester, or August 1 for the fall semester. Full-time employees with one or more years of service who receive permission to take such courses will be charged one-half the tuition rate shown above for part-time students during the fall and spring and one-half of the summer tuition rate. Qualified employees must see Harrison Brooke or Donna L. Ribet (303 Allen Building) at least one week in advance of payment date to obtain a tuition reduction voucher to cover the remaining half of the tuition.

Living Expenses*

Housing for Fall and Spring. In dormitories for undergraduate students the housing fee for a single room ranges from \$1,753 to \$2,300 for the academic year; for a double room, the fee ranges from \$1,318 to \$1,734 per occupant.

To reserve University housing for the fall semester, returning students who are eligible for and wish to occupy such housing must make a \$50 prepayment of the housing fee at a designated time during the spring semester.

Detailed information concerning the student's obligations under the housing contract and the consequences of failure to comply are published in the *Bulletin of Duke University: Information and Regulations*.

Housing for Summer. For detailed information on types and costs of accommodations available at Duke University for the summer session write: Department of Housing Management, Duke University, Durham, North Carolina 27706.

Food Services. See the section on dining facilities in the chapter "Campus Life and Activities" for a description of dining facilities on both campuses and the options or requirements for board contracts. The charge for board ranges from \$635 to \$995 per semester, payable at the time of registration. For summer terms, optional board contracts are available. Meals may also be purchased on an a la carte basis.

Fall and Spring Refunds

In the case of withdrawal from the University, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

<i>Withdrawal</i>	<i>Refund</i>
Before classes begin	Full amount
During first or second week	80 percent
During third, fourth, or fifth week	60 percent
During sixth week	20 percent
After sixth week	None

Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward. In the event of death, a full tuition and fees refund will be granted.

In the case of changing category from full-time to part-time, dropping special fee courses (e.g., music, art, golf), or dropping audit courses, a full refund will be granted students during the drop-add period. Subsequent to the drop-add period changes of category will not be allowed from full-time to part-time. Students may, however, withdraw from courses after the drop-add period with no refund or add new courses if the proper tuition is paid.

The registration deposit will be refunded to students whom the University does not permit to return, who graduate, or who request the refund prior to registration, thereby indicating their intention not to return for the following semester. The registration deposit will not be refunded to students who register for the following semester but fail to enter. Arrangements for refund of the \$100 residential deposit are described in information furnished to each student by the Department of Housing Management.

*The figures contained in this section are projections and are subject to change prior to the beginning of the fall 1985 semester.

Summer Withdrawal Charges and Refunds†

Drop or Withdrawal Charges. Students who will not be attending a summer term or course for which they have registered must officially drop the course(s) prior to the beginning of class whether or not they have paid tuition and fees. (See the section on course changes for the summer term in the chapter "Academic Procedures and Information.") Students who fail to drop the course(s) will be charged 20 percent of the tuition plus the health fee.

Refunds. Students who will not be attending a summer term or course for which tuition and fees have been paid are eligible for refunds following these policies:

1. There is no refund of tuition and fees if the student drops a course(s) or withdraws from the term after the third day.
2. Eighty percent of the tuition is refunded if the student officially drops a course(s) or withdraws from the term during the first three days. The health fee is not refunded. There is no charge for drop/adds that result in no change in tuition.
3. Full tuition and fees are refunded if the student officially drops a course(s) or withdraws from the term before the first day.

Student Aid

Duke University has a comprehensive aid program that includes both merit and need-based scholarships, college work-study, the National Direct Student Loan Program (NDSL), and the Guaranteed Student Loan Program (GSL). Students who might be financially unable to attend Duke University are encouraged to apply for financial aid at the time of application. Students receiving financial aid will be notified at the same time that they are offered admission. Need is the primary concern in the issuing of financial aid. Demonstrated need is determined by using as a base a nationally accepted formula, approved by the Department of Education.

For the student with demonstrated need, the net cost of an education at Duke University will generally be no greater than that for attendance at any college or university. It is the intention of the Office of Undergraduate Financial Aid to set each award at a level consistent with a student's ability to meet the costs of attending Duke University. This will be done by taking into consideration the contribution that can reasonably be expected from the student, the family, and any available outside sources. During the current academic year, approximately one-third of the student body receives more than eleven million dollars in aid of various types.

Financial Aid for Entering Freshmen. Candidates should initiate their application for financial aid concurrently with their application for admission during the fall semester of their senior year in secondary school. Instructions concerning the specific requirements and deadline dates will accompany application materials. The Financial Aid Form (FAF) must be submitted to the College Scholarship Service. In divorce cases, the University requires both parents to complete and submit a FAF which may be obtained either from a high school guidance counselor or from the financial aid office. A notarized copy of all pages, including schedules and attachments, of the parents' current Federal Income Tax Form must be submitted to the financial aid office on or before May 1. Information provided on the FAF will be validated through the use of the tax return.

Financial aid recipients wishing to operate a motor vehicle on campus must first register it with the financial aid office. As an automobile represents an asset, the value of a financial aid recipient's car will be considered in the estimation of a student's need. As a general rule, a student's annual contribution will be increased by 35 percent of the value of the car.

†This policy does not apply to foreign programs.

Renewal of Financial Aid after the Freshman Year. Each year students must file an application for renewal of financial aid. This application must include a new Financial Aid Form and a notarized copy of all pages, including schedules and attachments, of the parents' current Federal Income Tax return. Application packets may be picked up in the Financial Aid Office in late December.

To have financial aid renewed, a student must meet the continuation requirements outlined on pages 24, 25, 34, and 35, as appropriate. Students not qualifying for financial aid due to their inability to meet these requirements may appeal directly to the financial aid office. Students holding merit scholarships are required to maintain an average considerably higher than the minimum required for need-based financial aid recipients. Specific details regarding retention standards will be provided to scholarship winners.

Types of Financial Aid. Gift scholarships or grants, long-term loans, and employment are integral parts of the financial aid program, and some portion of the aid offered an undergraduate is normally in each of these forms.

The work-study opportunity and loan(s) offered as financial aid are considered to be the self-help portion of the award. The standard aid package at Duke provides that the first \$2,600 to \$3,500 of each student's need be awarded in the form of self-help funds. Funds awarded in excess of this amount will be grant funds. This combination of University grant funds and opportunities for self-help enables Duke to extend its resources to a larger number of deserving students. A student may choose not to accept any portion of an aid award with the understanding that the responsibility for providing the dollar equivalent is accepted by the individual.

Duke has several scholarships based on need which are available from personal endowments and corporations. Some are intended for entering freshmen, whereas others are awarded to upperclass students. These scholarships may be based on achievement in a particular field or on an outstanding overall record.

Gift Scholarships. The following are among the named gift scholarships offered through Duke University:

Angier B. Duke Memorial Scholarships. The Angier B. Duke Memorial Scholarships, competitively awarded on the basis of academic merit, have been established to encourage the intellectual achievement of men and women by recognizing those who possess outstanding academic and leadership abilities. Candidates are selected on the basis of intellectual performance, creative talent, and promise of being eventual leaders in whatever field of endeavor they choose. The scholarship is a four-year program (eight semesters), and a student's continuation in the program is contingent upon good academic performance. All 1984-85 scholarship holders received \$7,380 if enrolled in Trinity College of Arts and Sciences, and \$7,920 if enrolled in the School of Engineering. Twenty scholarships are awarded each year. Students demonstrating additional need will receive a grant from Duke University funds up to the amount needed. All Angier B. Duke Scholars participate in a six-week summer study program at Oxford University in England after the junior year. Under the program the scholarship pays tuition, single room accommodation, full board, designated excursions for all scholars, and an allowance for transatlantic air fare between New York and London. Those choosing not to participate in the Oxford program are eligible for a \$2,000 grant for an approved independent project. At least one of the four years of the scholarship could be used abroad on an approved program.

W. N. Reynolds Memorial Scholarships. Recipients of these awards are students with outstanding ability and/or need who show promise of constructive leadership. In considering candidates for the awards, consideration will be given in the following order: (1) children of employees of R. J. Reynolds Tobacco Company or any of its affiliates or subsidiaries; (2) children of families residing in Forsyth County, North Carolina; and (3) other candidates who are residents or natives of North Carolina. There are four awards available for each freshman class with a value of \$500 to \$3,600 annually.

A. J. Fletcher Scholarships. These music department scholarships are given to students who can demonstrate, by tape or audition, talent and achievement in instrumental or vocal performance. These awards are \$500 per year and are renewable annually for up to four years. Although recipients are not required to major in music, they are expected to study privately and to participate in departmental performing groups.

United Methodist Scholarships. A number of United Methodist Scholarships, valued at \$500 per year, are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship groups.

Alice M. Baldwin Scholarships. One or more of these scholarships, varying in amount from \$500 to \$1,500, are awarded to women who are rising seniors in Trinity College of Arts and Sciences on the basis of scholarship, character, and leadership.

Evelyn Barnes Memorial Scholarship. One \$400 or two \$200 grants are awarded to undergraduate women who are contributing to the musical life of the University. Scholarship, character, and leadership are considered. Recommendation by a member of the music faculty is required.

Panhellenic Scholarship. A scholarship of approximately \$500 is awarded to an upperclass woman in Trinity College of Arts and Sciences on the basis of scholarship, character, leadership, and service.

J. Welch Harriss Scholarships. Recipients of these scholarships will receive \$1,000 per year without reference to need. If demonstrated need exceeds \$1,000, then the scholarship will be adjusted accordingly. These awards are made to entering freshmen who have achieved outstanding academic records. They are renewable each year as long as the student remains in good academic standing. Consideration will be given in the following order: (1) students from High Point, North Carolina; (2) students from Guilford County, North Carolina; and (3) students from North Carolina.

Alyse Smith Cooper Scholarships. Each year six or more scholarships of various amounts are awarded to students demonstrating both talent and need. Preference is given to students from Alamance County, North Carolina. Majors in music, particularly students of piano, organ, and voice, receive special consideration.

Braxton Craven Endowed Scholarships. Recipients of these scholarships will receive an amount equal to the current tuition at Duke. Braxton Craven scholars will be chosen on the basis of outstanding academic and extracurricular achievement. First preference is given to Davidson County, North Carolina, residents and second preference to students from North Carolina. The scholarships are approved on a continuing basis, providing satisfactory academic progress is achieved.

J. A. Jones Memorial Scholarships. The scholarships, sponsored through the Jones Fund for Engineering, are awarded to engineering students whose outstanding academic and personal qualifications suggest that they will become leaders in a technological society. The awards range from a yearly sum of \$1,000 to \$3,000, depending on the degree of need.

Robert H. Pinnix Scholarships. The Robert H. Pinnix Scholarships are awarded annually to two upperclassmen enrolled in the Duke School of Engineering. The award is based upon demonstrated ability, excellence in engineering, and financial need.

Scholarships for Foreign Students. A limited number of awards will be made each year to qualified students from other countries who enter as freshmen. Candidates for these awards are required to submit the Application for Scholarship and Financial Aid and the Financial Aid Application for Foreign Students provided by the Office of Undergraduate Financial Aid of Duke University. Two named awards are awarded to currently enrolled foreign students: the Carol Cranmer Scholarship (named for a former student) and the Roberta Florence Brinkley International Scholarship (named for a former Dean).

The Mary Duke Biddle Scholarship in Music Composition. This scholarship with a stipend of \$3,500 per year is available to a member of each entering class. It is renewable from year to year so long as the student does satisfactory work. Students wishing to apply for this award will be required to submit examples of their composition. Eligibility is limited to students planning to major in music.

AFROTC College Scholarship Program. Students can apply for three-year scholarships during their freshman year and two-year scholarships during their sophomore year. Scholarships are available to students who qualify for flight training and to students who major in certain scientific or engineering fields. The scholarships include tuition, fees, and textbook reimbursement, plus a \$100 per month tax-free allowance.

Army ROTC Scholarship Program. All freshman and sophomore students are encouraged to apply for Army ROTC scholarships. Awarded without regard to academic major, these grants pay tuition, fees, and textbook/equipment costs in addition to providing a tax-free monthly stipend of \$100 for the balance of the student's normal period to graduation. Commissioned service, following graduation, can be either on active duty or with the reserve forces. Additional information concerning Army ROTC scholarships is available from the Professor of Military Science.

NROTC College Scholarship Program. This program provides for up to four years' tuition and textbooks, laboratory fees, and a \$100 per month stipend. These scholarships, based upon academic achievement, leadership potential, and overall performance, can be awarded at any stage of the student's college career through either a nationwide selection process or by the Professor of Naval Science at the University. In addition, two other two-year scholarships are available to rising juniors: one leads to a career in nuclear power, and the other follows a summer attendance at the Naval Science Institute at Newport, Rhode Island. For further information on any of the above scholarship programs, contact the Professor of Naval Science.

The Minnie Happer Pruden Scholarships. These scholarships are available to the daughters of Episcopal clergymen.

The Huguenot Scholarship. One scholarship of \$1,000 per year is available from the Huguenot Society of America to a descendant of a Huguenot.

Reginaldo Howard Scholarships. These scholarships, awarded annually to freshman minority students, are provided to honor the late Reggie Howard, first black president of the student government. Ten schol-

arships for \$1,000 in honorary funds to \$2,900 for students with need are awarded each year. Scholarships are available for the four years of undergraduate study as long as the student maintains a 3.0 average.

Alumni Endowed Scholarships. Three \$3,000 per year Alumni Endowed Undergraduate Scholarships are awarded to students who demonstrate superior academic ability and leadership potential. These awards are renewable annually, based on satisfactory performance at Duke. Although not restrictive, preference is given to children of alumni who apply for February notification.

Scholarships for North Carolina Residents:

North Carolina Math Contest. Upon enrolling at Duke, each student finishing in the top twenty in the North Carolina Math Contest is eligible to receive a scholarship equal to the amount of tuition. This scholarship is available for each of the four years of undergraduate enrollment as long as the student maintains a 3.0 average.

Duke North Carolina Scholars Awards. Scholarships funded by Duke University are awarded annually to selected incoming freshmen from North Carolina. Scholarships are renewable for the four years of undergraduate study as long as the student maintains a 3.0 average. Scholarships are valued at \$3,000.

North Carolina Legislative Tuition Grant. The North Carolina General Assembly has established a program of tuition grants available to North Carolina residents who are full-time students at private colleges and universities in the State of North Carolina. The grant for each eligible student is \$425 per semester. Applications will be mailed to all eligible students during the summer.

In the case of a need-based financial aid recipient, this grant reduces a student's tuition and therefore his budget. All qualified need-based aid recipients are required to apply for this grant.

State Contractual Scholarships for Needy North Carolinians. Funds provided by the State of North Carolina through the Legislative Grant Program are distributed to needy North Carolinians qualifying for the State Contractual Scholarship Program. Application is made through the College Scholarship Service's Financial Aid Form.

In addition to the above, Duke offers other special programs to North Carolina residents. These include a work-study program designed to assist students not qualifying for financial aid and a special reduced self-help plan for needy North Carolinians.

Loans. The loan programs which are available to students through Duke University are listed below:

National Direct Student Loan Program. Loan funds supplied by the federal government and Duke University through Part E of Title IV of the Higher Education Act of 1965 are available to qualified students. Repayment of loans under this act normally begins six months after the student is graduated or leaves college, with complete payment scheduled within a ten-year period. Interest accrues at the rate of 5 percent annually, commencing six months after the borrower ceases to be at least a half-time student at an institution of higher education. This loan is part of the student's financial aid award.

Guaranteed Student Loan Program. Loans under the Guaranteed Student Loan (GSL) program are available from banks or other incorporated state lending agencies. Duke University can arrange an alternate lender for students who are unable to obtain GSLs through their home state agencies or local banks. Need as required by the federal government formula will be a factor in the University's decision regarding GSL applications. The program enables students from families with adjusted gross incomes of \$30,000 or less to qualify for these loans; students from families whose most recent yearly adjusted income exceeds \$30,000 may qualify by submitting a GSL Needs Test along with the application. The limit on a GSL, which has an interest of 8 percent, is \$2,500 a year. Additional information about this loan program may be obtained from the undergraduate financial aid office.

Parents' Loan for Undergraduate Students Program. Parents may borrow through the Parents' Loan for Undergraduate Students (PLUS) program. Repayment of these loans begins sixty days after loan disbursement. Interest is 12 percent and begins to accrue at the point repayment begins. Interested parents should contact their home state lending agency.

Children of Methodist Ministers. Children of ministers in the North Carolina and the Western North Carolina Annual Conferences of the United Methodist Church may be eligible to receive a partial tuition grant of \$750 per semester for a maximum of eight semesters of undergraduate study at Duke University. Eligibility is met by the parent being in a regular pastoral appointment and resident in one of the conferences. When the parent is in a special appointment and resident in one of the conferences, eligibility will be determined on an individual basis, depending upon the nature of the appointment. In all cases the decision of the University will be final.

Employment. Most financial aid recipients are offered a job as part of their aid package. These jobs require between 10 to 14 hours a week and provide an average stipend of \$1,400. The money is paid directly to the student. The Office of Placement

Services maintains part-time employment listings for the campus and Durham area. All students interested in working during the school year should register at the beginning of the semester. Every effort will be made to help students find jobs consistent with their interests.

Duke University also expects that students receiving financial aid will work during the summer. In the summer before entering college, a freshman should save \$1,000 for use during the first year of college. In subsequent summers, the student should save \$1,200 to be used for college expenses.

Tuition Plans. Many families finance a college education with the assistance of an insured tuition payment plan regardless of whether they receive financial assistance from Duke. Although these plans are sponsored by a number of private firms, the University refers parents to plans provided by the Richard C. Knight Insurance Agency, Inc. The company provides the University with the full sum required each semester and arranges a schedule for monthly repayment by the subscribing families. The schedules for repayment vary with the program offered by the company. Additional information on this particular tuition payment plan may be obtained by writing to Richard C. Knight Insurance Agency, Inc., Insured Tuition Payment Plan, 53 Beacon Street, Boston, Massachusetts 02108. Tuition payment plans are also available through the Tuition Plan, Concord, New Hampshire 03301.

Courses of Instruction



Definition of Terms

Courses taught in 1983-84 or in 1984-85 or scheduled for 1985-86 are included in this chapter with full descriptions. Additional courses, that were taught prior to 1983-84 and that are likely to be taught in the future, are listed separately by number and title only under the heading *Courses Currently Unscheduled*. For courses which will be offered in 1985-86, consult the *Official Schedule of Courses*.

Introductory level courses are numbered below 100; advanced level courses are numbered 100 and above. Courses numbered 1 through 49 are primarily for freshmen; courses numbered from 200 through 299 are primarily for seniors and graduate students. (See the section on course load and eligibility in the chapter "Academic Procedures and Information.")

Odd-numbered courses are usually offered in the fall semester; even-numbered courses in the spring semester. Double numbers separated by a hyphen indicate that credit is contingent upon completion of both courses. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either course or both courses.

The following symbols, suffixed to course numbers, identify the small group learning experiences: *S*, seminar; *P*, preceptorial; *T*, tutorial; *D*, discussion section. The *L* suffix indicates that the course includes laboratory experience. *C-L*: denotes a course that is cross-listed or a program under which a course is listed.

Trinity College of Arts and Sciences

Professor Friedl, *Dean of Arts and Sciences and of Trinity College*; Associate Professor Eldridge, *Associate Dean*; Assistant Dean Bryan, *Coordinator of Institutional Research and Special Projects*; Assistant Dean Nathans, *Director of the Premajor Advising Center*; Assistant Dean Nijhout, *Director of Health Professions Advising*; Assistant Dean Wilson, *Coordinator of the Dean's Staff*; Assistant Dean Wittig, *Coordinator of Curriculum*; Assistant Deans Bryant and Silver

Aerospace Studies—Air Force ROTC (AS)

Professor Haerle, Colonel, USAF, *Chairman*; Assistant Professor Cummings, Major, USAF, *Director of Undergraduate Studies*; Assistant Professors Holley, Captain, USAF and Trimmer, Captain, USAF

Eligibility Requirements. All freshmen and sophomores, men or women, are eligible to enroll in the General Military Course in the Air Force Reserve Officer Train-

ing Corps. For enrollment in the Professional Officer Course, the student must have completed successfully either the General Military Course or the six-week field training course; must execute a written agreement with the government to complete the Professional Officer Course; must be sworn into the enlisted reserve; and must agree to accept a commission in the U.S. Air Force Reserve upon graduation. In addition, each student must take at least one course in mathematical reasoning prior to graduation/commissioning. All students also will be required to attend one hour of leadership laboratory each week.

General Military Courses

First Year

1. The Air Force Today. Development of aerospace power in the United States; mission, doctrine, and organization of the U.S. Air Force and its relationship to the other services within the Department of Defense. (May not be counted to satisfy graduation requirements.) Half course. *Haerle*

Second Year

51. Development of Air Power. Growth and development of air power from dirigibles and balloons to the present emphasizing evolution of concepts and doctrine governing air power employment in support of national objectives. (May not be counted to satisfy graduation requirements.) Half course. *Trimmer*

Professional Officer Courses

All students selected to continue aerospace studies pursue the following courses:

First Year

105S. Aerospace Leadership and Management. An introduction to management fundamentals to include the knowledge base and process of managing. One course. *Holley*

106S. Aerospace Leadership and Management. Application of management fundamentals to duties as junior officers/executives to include principles of leadership. One course. *Holley*

Second Year

203. The Problems of Flight. Equivalent to FAA ground school for private pilot certification. Mandatory for Air Force ROTC category 1P cadets entering the Flight Instruction Program. Open to other students with consent of instructor. Half course. *Haerle*

205S. National Security Forces in Contemporary American Society. The role of the professional military officer in a democratic society and the environment in which national security policy is formulated. One course. *Cummings*

206S. National Security Forces in Contemporary American Society. The evolution of U.S. nuclear strategy, the international context in which national security policy is implemented, and the military justice system. One course. *Cummings*

Afro-American Studies (AAS)

The program in Afro-American Studies provides instruction directed toward the experience and concerns of black America. The courses encompass the black experience in America and the black experience as illuminated by literary, religious, and cultural evidence generated by black Americans. The courses in the program are essential components of a liberal arts education and may constitute a major or comple-

ment another major. In addition to the courses listed below, many related courses are offered. Descriptions can be found under the Departments of Anthropology, Economics, History, Political Science, Public Policy Studies, Religion, and Sociology. Swahili courses are described under Asian and African Languages. Further information is available in 107 Allen Building.

56. The Black Religious Experience in America. C-L: Religion 56. One course. *Lincoln*

74. Introduction to Jazz. See C-L: Music 74; also C-L: Canadian Studies. One course. *Jeffrey*

138. Political Leadership in the Black Church. C-L: Religion 138. One course. *Lincoln*

144. Black Cults and Sects in America. C-L: Religion 144. One course. *Lincoln*

145, 146. Afro-American History. C-L: History 145, 146. Two courses. *Gavins*

173, 174. Afro-American Literature. C-L: English 167, 168. Two courses. *K. Williams*

213S. Economics of Slavery in the American South. Prerequisites: Economics 149 and consent of instructor. C-L: Economics 213S. One course. *Coats*

265. Religions of the West Africa Diaspora. See C-L: Religion 265; also C-L: Comparative Area Studies. One course. *Lincoln*

THE MAJOR

Eight courses are required for the major. The course of study for each student is planned by the student and the student's adviser in the light of the student's interests and goals.

Anthropology (AN)

Professor O'Barr, *Chairman*; Associate Professor Glander, *Director of Undergraduate Studies*; Professors Cartmill, Fox, Friedl, and Simons; Associate Professors Apte, Hylander, Quinn, and Smith; Assistant Professors Domínguez, Trouillot, Weller, Williams, and Zagarell; Professor Emeritus La Barre; Adjunct Associate Professors Kay (anatomy) and Stack (public policy studies)

Students without prerequisites for a course may ask the instructor for admission.

93. Human Origins. Origins and distribution; primate evolution; a survey of human paleontology and human biology, prehistory, and language; and the origins of human social organization and culture. One course. *Staff*

94. Introduction to Cultural Anthropology. The dynamics of culture and society; form and function of social institutions. Emphasis upon primitive and complex societies. C-L: Comparative Area Studies. One course. *Staff*

94S. Introduction to Cultural Anthropology. See Anthropology 94. C-L: Comparative Area Studies. One course. *Staff*

101,102. Introduction to the Civilizations of Southern Asia. C-L: Comparative Area Studies, History 193, 194, Interdisciplinary Course 101, 102, and Religion 160, 161. Two courses. *Lawrence and Staff*

105. History of Anthropology. Introduction to the origins and development of anthropology as a professional discipline in the Western world, with emphasis on cultural anthropology. Cultural milieu in America, Britain, and France and its effects

on the subsequent professionalization and institutionalization of the discipline. One course. *Fox*

107. Introduction to Linguistics. Origin and nature of language; methods of descriptive linguistics with reference to historical and comparative linguistics. Prerequisite: sophomore standing. C-L: English 111, Interdisciplinary Course 111, and Linguistics. One course. *Staff*

109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*

110. Advertising and Society. History and development of commercial advertising; advertising as a reflector and/or creator of social and cultural values; advertisements as cultural myths; effects on children, women, and ethnic minorities; advertising and language; relation to political and economic structure; advertising and world culture. Primary emphasis on American society with consideration of selected other cultures. One course. *O'Barr*

112. Current Topics in Linguistics. Advanced study of an area of linguistics or grammar. C-L: English 119, Interdisciplinary Course 119, and Linguistics. One course. *Staff*

115. Gender Roles: A Cross-Cultural Perspective. Examination of social, economic, cultural, and biological bases for variation in sex division of labor, men's and women's power and autonomy, and gender ideology, in societies ranging from hunters and gatherers to contemporary industrial states. C-L: Comparative Area Studies and Women's Studies. One course. *Staff*

116. Language, Ethnicity, and New Nations. Examination of problems facing newly independent countries of Asia and Africa in developing national integration from the theoretical perspectives of sociolinguistics and anthropology. Prerequisite: Anthropology 94. C-L: Comparative Area Studies and Linguistics. One course. *Apte*

118S. The Language of Advertising. Topics include: history and development of the genre of advertising language; comparisons to the specialized language used in medical, legal, and other professional contexts; and relation of topics to sociolinguistic theories and anthropological field methods. Primary focus on American television, print, and radio advertising and consideration of advertising language in certain other cultures. Directed field projects. Prerequisite: Anthropology 110 or consent of instructor. C-L: Linguistics. One course. *O'Barr*

119. Language, Culture, and Society. Analysis of language behavior within and across societies relating variations in linguistic usage to sociocultural factors: ethnosemantics, social dialects, and ethnography of speech. Prerequisite: Anthropology 94. C-L: Comparative Area Studies and Linguistics. One course. *Apte or Weller*

120. South Asia: Institutions and Change. Indigenous cultures and societies of India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Bhutan with emphasis on social institutions, behavioral patterns, value systems, and sociocultural change. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *Apte or Fox*

121. China: Tradition and Transformation. Culture and social life in late imperial China; continuation and transformation in the twentieth century. Topics include religion, kinship and family, the position of women, imperialism, economic change in Taiwan, and the revolution. C-L: Comparative Area Studies. One course. *Weller*

123. Societies of Mediterranean Europe. Social institutions, cultural patterns, and social change. C-L: Comparative Area Studies. One course. *Friedl*

125. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Comparative Area Studies, History 137, Political Science 125, and Sociology 125. One course. *Staff*

126. Middle East: Wars, Revolutions, and Social Change. Political and institutional consequences of different forms of social relations. Topics include male-female relations, tribalism, traditional and experimental forms of family organization, ethnic and national identities and conflicts, and the impact of colonialism and the modern world system on the region. C-L: Comparative Area Studies. One course. *Domínguez*

127. Social Transformations in Central America. Current issues affecting the peoples of Central America in historical and anthropological perspective; analysis of revolution through the development of distinctive social structures and cultural forms. C-L: Comparative Area Studies. One course. *Smith*

128. Caribbean Societies and Cultures. Social, economic, and political development within the world system; social differentiation, cultural fragmentation, colonialism, and dependence; the effects of slavery; and the Caribbean diaspora. C-L: Comparative Area Studies. One course. *Domínguez, Trouillot, or Williams*

129. The Black Experience in the Americas: Roots and Directions. The shared experience of plantation slavery and "blackness"; national and regional differences. C-L: Comparative Area Studies. One course. *Trouillot*

130. Social and Cultural Change. Contemporary theories of change, including innovation, acculturation, and modernization. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *O'Barr or Smith*

131. Socialism and Society in China. The People's Republic of China since 1949: socialist economic development, political life, population control, local community organization, the arts, and dissidence. C-L: Comparative Area Studies and Women's Studies. One course. *Weller*

132. Human Evolution. Evolutionary biology of the primates. Anatomical and behavioral adaptations and phylogeny of fossils and living primates including *Homo sapiens*. Prerequisite: Anthropology 93 or equivalent. One course. *Cartmill, Glander, or Simons*

133. The Effects of Colonialism and Neocolonialism on Native Peoples. The effect of governmental policies and interests, dominant populations, and local and international economic concerns on indigenous peoples, whether living as enclaves in nation states or as dependencies. C-L: Comparative Area Studies. One course. *Fox or Smith*

134. Political Anthropology. Comparative study of politics and government in tribal and peasant societies. Evolution of political systems. Political changes resulting from contact and colonialism. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *O'Barr, Smith, or Williams*

135. American Culture: Research and Analysis. The shared understandings of American culture, and how they are learned and organized, in domains such as kinship, marriage and family, child rearing, work, economic behavior, ethnicity, personality and character, gender, health and illness, and social interaction. One course. *Domínguez, Quinn, or Stack*

136. Cross-Cultural Studies of Socialization. Effects of socialization on behavior. Child-rearing theory and practice in different cultures. Cross-cultural findings and child development theory. C-L: Comparative Area Studies. One course. *Quinn or Williams*

137. Incest, Adultery, and Other Problems in Kinship and Marriage. Cross-cultural attitudes to human sexuality. Varieties of family life and its integration in the political and economic context of human societies. Prerequisite: Anthropology 94. C-L: Women's Studies. One course. *Domínguez or Quinn*

139. Marxism and Society. A critical appraisal of Marxism as a scholarly methodology for understanding human societies. The basic concepts of historical materialism, as they have evolved and developed in historical contexts. Topics include sexual and social inequality, alienation, class formation, imperialism, and revolution. Core course for the program in Perspectives on Marxism and Society. C-L: Sociology 139. One course. *Fox or Wilson*

140. The Anthropology of Race. Human biological variation and the historical development of the race concept in physical anthropology; folk concepts of race and the political-economic causes of racism. C-L: Comparative Area Studies. One course. *Fox*

141. The Self and Others: Ethnic, Racial, and Social Classifications. The nature of human social identities, the contexts in which they are shaped, and the processes by which they change; emphasis on ethnic, racial, and gender identities. One course. *Domínguez or Williams*

143. Primate Biology. A comprehensive survey of primate feeding strategies and general ecology. One course. *Glander or Simons*

144. Evolutionary Study of Behavior. Phylogenetic comparison of communication, infant socialization, aggression, and sexual behavior as they pertain to species group structure. Emphasis on primates. One course. *Glander or Simons*

145. Medical Anthropology. Evolution and disease, theories of disease and healing; and factors influencing behavior in health and illness. One course. *Weller*

147, 148. Introduction to Islamic Civilization. Prerequisite: consent of Director of Undergraduate Studies. See C-L: Interdisciplinary Course 162, 163; also C-L: Comparative Area Studies; History 101G, 102G; and Religion 162, 163. Two courses. *Lawrence and staff*

152S. Food in Cross-Cultural Perspectives. The behavioral, institutional, linguistic, religious, and ideological aspects in relation to the production, distribution, and consumption of food within and across cultures. One course. *Apte*

155. Anthropological Approaches to Religion. Cross-cultural perspectives on the relationship of religion to experience, behavior, conflict, and change. C-L: Comparative Area Studies. One course. *Weller*

156. The Politics of Ritual Performance. Current theories of ritual performance; its relation to and effect on intra- and intergroup politics. One course. *Williams*

158S. Cross-Cultural Studies of Humor. Sociocultural basis, nature, scope, and function of humor. Prerequisite: Anthropology 94. One course. *Apte*

159. Language and the International Order. Economic mechanisms that affect language distribution; formation of the world-system and the spread of European languages; colonialism and neocolonialism; Creolization and bilingualism; technological advances and linguistic domination. One course. *Trouillot*

160S. Anthropology and Literature. The interrelationships of literature, both oral and written, and social structure and cultural patterns. Special emphasis on oral literature. One course. *Apte*

163. Foundations of Chinese Civilization. The contemporary experience in China and its relation to ethnic, spiritual, social, aesthetic, moral, political, and economic

themes in China's past. Taught in China. C-L: Comparative Area Studies and History 163. One course. *R. Davis, Dirlik, Kunst, or Weller*

164. Peasantry and Peasant Movements. The genesis of peasant movements. Forms of peasant protest and its role in the economic, political, and ritual life of societies. Case studies from Western and Eastern societies, past and present. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *Fox, Smith, Trouillot, or Weller*

165. Psychological Anthropology. Anthropological contributions to sociobiology, socialization theory, social psychology, and cognitive science in the effort to understand human nature. One course. *Quinn*

166. Introduction to Archaeology: Humans and Culture. Modern methodology and analysis, theories of cultural evolution, survey of world prehistory with an exploration of the uses of ethnographic analogy. One course. *Zagarell*

167. Prehistoric Technology. Procurement of raw materials, manufacturing of objects, and the usage of these objects in archaeological context. One course. *Zagarell*

168. Beginnings of Civilization. Cultural developments from the beginning of agriculture to the rise of civilization in Africa, Mesoamerica, Peru, India, Southwest Asia, and China, using archaeological and ethnographic examples. C-L: Comparative Area Studies. One course. *Zagarell*

170. Economic Anthropology. Primitive, peasant, and world-system economics, and theories that both accept and challenge the neoclassical framework. Topics include primitive and complex modes of production, exchange, and marketing; the rise and organization of the capitalist world economy; and the transformation of precapitalistic modes of production and exchange in the modern world. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *Quinn, Smith, or Trouillot*

180. Current Issues in Anthropology. Selected topics in methodology, theory, or area. One course. *Staff*

193. Independent Study. Directed reading and research. Open only to qualified seniors, with consent of Director of Undergraduate Studies. One course. *Staff*

195S, 196S. Senior Seminar. Prerequisites: Anthropology 94 and any 100-level course in anthropology, as well as consent of Director of Undergraduate Studies. Two courses. *Staff*

For Seniors and Graduates

201S. Marxism and Anthropology. The interaction of Marxist and anthropological theory over the last half century; particular attention to evolution, historical transformation, mode of production, labor processes, culture, ideology, and consciousness. One course. *Smith*

204S. The Anthropology of Cities. Organization and behavior in urban centers from an evolutionary perspective; cross-cultural analysis of cities. Prerequisite: Anthropology 94. C-L: Canadian Studies and Comparative Area Studies. One course. *Fox or Smith*

205. The Anthropology of Anthropology. Effects of the organization and professional status of anthropological schools in the United States, Britain, and France up to World War II as they affected anthropological theory. Prerequisite: major in anthropology or graduate standing. One course. *Fox or Weller*

206S. Current Theoretical Schools in Anthropology. The theoretical schools since World War II, including cultural materialism and neo-Marxism, structuralism,

cognitive anthropology, cultural analysis and symbolic anthropology, transactional analysis, and sociobiology. Prerequisite: Anthropology 94 or graduate standing or permission of instructor. One course. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, Trouillot, Weller or Williams*

211S. Ethnography of Communication. History of the mutual influence of linguistics and anthropology leading to the development of ethnography of speaking, ethnoscience, structuralism, and sociolinguistics. Topics vary each semester. Prerequisite: Anthropology 107 or 119. C-L: Linguistics. One course. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, Trouillot, Weller, or Williams*

215S. The Anthropology of Women: Theoretical Issues. Topic to be selected each semester from: gender ideology, women and work, gender inequality, the history of feminist anthropology, or others. C-L: Comparative Area Studies and Women's Studies. One course. *Domínguez, Quinn, Smith, or Trouillot*

218. Culture and Thought. The role of culture in the organization of knowledge for the performance of everyday cognitive tasks and of thematic knowledge for the broader purpose of living, such as understanding oneself and others' behavior and pursuing one's life goals. One course. *Domínguez or Quinn*

228S. Slavery and Society. Western and non-Western systems of slavery and their effects on social organization, self-concepts, and race relations. C-L: Comparative Area Studies. One course. *Domínguez*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Comparative Area Studies, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, Smith, Trouillot, or Valenzuela*

237S. Interpretations of Kinship. The major interpretations of kinship in social organization. One course. *Domínguez, Quinn, or Williams*

239. Culture and Ideology. Major theories about the relation between ideologies and social/economic systems. Readings from the works of Marx, Weber, Gramsci, Althusser, Geertz, and others. C-L: Comparative Area Studies. One course. *Trouillot, Weller, or Williams*

241. The Rise of Civilization in Mesopotamia and Iran. An introductory survey of the major stages of development from the beginnings of agriculture to the collapse of the early state-system (10,000-1,800 B.C.E.). Archaeological and textual evidence, focusing on the rise of the Mesopotamian state-system, the nature of that system, and the mechanisms leading to its collapse. C-L: Comparative Area Studies. One course. *Zagarell*

243S. Theory and Method in Archaeology. Techniques of geochronology, environmental reconstruction, sociocultural reconstruction, and statistical analyses applied to problem areas in archaeology. Prerequisite: Anthropology 166. One course. *Zagarell*

244S. Primate Behavior. Social behavior of prosimians, monkeys, and apes and the evolutionary development of primates. One course. *Glander*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution. C-L: Anatomy 246S. One course. *Simons*

258S. Symbols in Society. Symbolic action and expressive culture among tribal, peasant, and industrial societies. Approaches emphasized are functionalism, symbolic interaction, structuralism, and cultural interpretation. One course. *Weller or Williams*

267. Cognitive Anthropology. The organization of culturally shared knowledge; cognitive tasks such as categorizing, decision making, problem solving, and reasoning. One course. *Quinn or Williams*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: consent of instructor. Two courses. *Staff*

282S. Canada. See Interdisciplinary Course 282S. One course. *Leach*

COURSES CURRENTLY UNSCHEDULED

99. Perspectives in Archaeology

122. Modern Africa

124. The American Indian

275S. Inequality in Precapitalist Societies

ANTHROPOLOGY COURSES BY FIELDS OF CONCENTRATION

Anthropology courses for undergraduates are offered in three fields, as noted below. Students majoring in anthropology are expected by the time of their graduation to have completed a concentration in one of the three fields.

Social-Cultural Anthropology. Core courses: Anthropology 105, 119, 134, 137, 155, 165, 170. Courses on major world areas: Anthropology 120, 121, 122, 123, 124, 126, 127, 128, 131, 163. More specialized courses: Anthropology 107, 109, 115, 116, 118, 119, 129, 130, 133, 135, 136, 140, 141, 145, 147, 148, 151, 156, 158, 160, 164, 180, 195, 196, 201, 204, 205, 206, 211, 215, 228, 234, 237, 239, 258, 267, 275, 280, 281, 282.

Physical Anthropology. Anthropology 132, 143, 144, 244, 246.

Archaeology. Anthropology 166, 167, 168, 241, 243.

THE MAJOR

The major in anthropology is offered under the Bachelor of Arts degree.

Major Requirements. Eight courses in the department, two of which must be 93 and 94. Concentration in one of the three fields of the discipline must be accomplished by completing at least three courses designated for the chosen field. The remaining three courses may be selected from other departmental offerings, either in the field of concentration or in other fields. Courses in each field of concentration are listed above, and the concentration requirements for each field follow:

Social-Cultural Anthropology Concentration. At least three courses distributed as follows: at least two courses from the core courses in social-cultural anthropology and at least one course from the list of courses dealing with the cultures and societies of a major world area.

Physical Anthropology Concentration. At least three courses selected from the offerings in physical anthropology, one of which must be 132.

Archaeology Concentration. At least three courses selected from the departmental offerings in archaeology, one of which must be 166.

Recommended Courses in Anthropology beyond Basic Requirements. Although an anthropology major consists of only eight required courses, students are encouraged to take additional courses both within their concentration and elsewhere in the department. The breadth of the discipline makes this desirable.

Suggested Work in Related Disciplines. Related courses in other departments are strongly advised. Each student's adviser will recommend a program of related work to complement the student's concentration and interests in anthropology.

Honors. Qualified majors are encouraged to participate in special work leading to graduation with distinction in anthropology. See the section on honors in this bulletin for general requirements. Any major with a B+ average (3.3 gpa) in an-

thropology courses and with a *B* average (3.0 gpa) in all courses is eligible. Students who desire to undertake honors work should request a member of the anthropology faculty to recommend their names to the Director of Undergraduate Studies. To receive departmental honors a major must complete a paper involving significant independent research or scholarship and pass an oral examination on the paper conducted by an appointed committee of faculty members, at least two of whom should be in anthropology. Normally, students will prepare their papers over the course of the senior year working in close collaboration with their committees and receiving on the average two course credits in independent study for the work.

Arabic

For courses in Arabic, see Asian and African Languages.

Art and Art History (ART)

Associate Professor Goffen, *Chairman*; Professor Spencer, *Director of Undergraduate Studies*; Associate Professors Stars and Pratt; Assistant Professors Bruzelius, Epstein, Higdon, and Melion; Professors Emeriti Hall, Jenkins, Markman, Mueller, and Sunderland; Adjunct Professor Lee; Part-time Instructors Menapace and Smith

HISTORY OF ART

Art history is intellectual history, providing students from all academic disciplines the opportunity to strengthen their powers of perception and expression and to bring together their various interests and different kinds of learning experiences. Art history is the study of works of art in their historical context, that is, in the context of their cultural, religious, philosophical, and sociological conceptions. Studying art history develops the ability to evaluate and organize different kinds of information and it enhances the faculties of creative imagination, precise observation, clear expression, and critical judgment. Students of art history acquire an appreciative awareness of the great aesthetic achievements of mankind and a sense of our cultural heritage.

A major or second major in art history is the appropriate training for students interested in teaching or scholarship in the history of art, in working in galleries or museums, or in art publishing. Art history is also an excellent preparation for those planning careers in medicine, law, or other professions.

69, 70. Introduction to the History of Art. The history of western architecture, sculpture, and painting in a cultural context. 69: from prehistory to the Renaissance (c. 1400). 70: from the Renaissance to the present. One course. *Staff*

125. Ancient Art. An introduction to the architecture, sculpture, and painting of ancient Greece and Rome from the Mycenaean Period through the sixth century A.D. One course. *Bruzelius or Melion*

128. The Age of Justinian. Sixth-century monuments—Hagia Sophia, the mosaics of Ravenna, the icons of Sinai—as the culmination of Late Antique classical culture and the initiation of the Christian Middle Ages; the social and historical context as seen in the writings of Procopius, Paul the Silentiary, and Romanus the Melode. C-L: Medieval and Renaissance Studies. One course. *Staff*

132. Romanesque Art. Western European art and architecture from the mid-tenth through the twelfth centuries. Influence of monasticism, the Crusades, and pilgrimages on the arts. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

133. Gothic Art. Western European art and architecture of the High Middle Ages to the early fifteenth century. Emphasis on the French contribution to the development of Gothic style. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

134. Medieval Architecture. The development of medieval architecture through the mid-fourteenth century. Emphasis on churches, with some discussion of castles and fortifications, town planning, and domestic architecture. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

135. Gothic Cathedrals. Major monuments of Gothic architecture in the twelfth and thirteenth centuries on the continent and in England with concentration on the great cathedrals of France. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

136. Gothic Cathedrals. Same as Art 135, but taught in French. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

140. Giotto and the Origins of the Renaissance. Painting and sculpture in Italy, with emphasis on Pisano, Duccio, Giotto, and the crisis of the Black Death. C-L: Medieval and Renaissance Studies. One course. *Goffen*

141. Fifteenth-Century Italian Art. Painting, sculpture, and architecture from Masaccio, Donatello, and Brunelleschi to Leonardo. Emphasis on the art of Florence. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

142. Sixteenth-Century Italian Art. Painting and sculpture in Rome and Florence: Michelangelo, Raphael, Leonardo. The rise and diffusion of mannerism: Pontorno to Tintoretto. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

147. Venetian Art: Fifteenth Century to the Eighteenth Century. Painting, sculpture, and architecture. Emphasis on Bellini, Giorgione, and Titian; the primacy of color; and the major themes of Venetian art: religion, politics, and sensuality. C-L: Medieval and Renaissance Studies. One course. *Goffen*

148. Art of Northern Europe in the Fifteenth and Sixteenth Centuries. Early Netherlandish painting with an emphasis on the innovations of the Master of Flémalle, Jan van Eyck, and Rogier van der Weyden; the visual culture of Renaissance Germany; attempts to appropriate Italian pictorial canons and define a native Northern tradition. C-L: Medieval and Renaissance Studies. One course. *Melion*

149. Death in Art. The theme of death from classical antiquity to the seventeenth century, with emphasis on medieval and Renaissance art and on the changing conceptions of death and of the individual. C-L: Medieval and Renaissance Studies. One course. *Goffen*

150. Prints in the Fifteenth, Sixteenth, and Seventeenth Centuries. The formats and functions of prints in Italy, Germany, and the Netherlands. Status of a replicative medium, notions of technical virtuosity, the conceit of a deceiving likeness, emblems, and the structure of title pages. Emphasis on Marcantonio Raimondi, Dürer, Goltzius, the Rubens workshop, and Rembrandt. C-L: Medieval and Renaissance Studies. One course. *Melion*

151. Art of Italy in the Seventeenth Century. Caravaggio, the Carracci, Guido Reni, Domenichino, Bernini, and Poussin. Modes of description and narration; the concern with the status of pictorial representation; and the attempts to define and retrieve the canonical achievements of the early sixteenth century. One course. *Melion*

152. Art of the Netherlands in the Seventeenth Century. The descriptive subject categories and the alternative modes of representation formulated by Rubens, Rembrandt, and Vermeer. One course. *Melion*

161. Nineteenth-Century European Art. Painting and sculpture of leading artists within the movements of neoclassicism, romanticism, impressionism, and symbolism. C-L: Comparative Area Studies. One course. *Staff*

162. Nineteenth-Century American Art. The efforts of American artists to create a national style. Consideration will be given to both native and European influences on the most significant artists of this period. One course. *Staff*

171. The New York School: Art of the 1950s. American art after World War II: abstract expressionism and the New York school. Emphasis on improvisation, gesture, and experimentation in the works of Pollock, de Kooning, Rothko, David Smith, Johns, and Rauschenberg. Historical influences and parallels with the other arts. One course. *Higdon*

173. Modern American Art. Art of the twentieth century in the Americas. Emphasis on the development of regional styles and the emergence of the United States in the vanguard of modernism. One course. *Higdon*

174. The History of Impressionism. The evolution of the impressionist movement and the works of its major masters. Particular attention will be paid to Monet, Degas, Cézanne, Pissarro, and Renoir. C-L: Comparative Area Studies. One course. *Staff*

175. Twentieth-Century Art. Modern art from 1900 to present. Emphasis on major movements, theoretical aims, and actual achievements. One course. *Higdon*

176. Surrealism. The surrealist movement that flourished in Paris between the World Wars; its origins, aims, and major adherents—such as the artists Miró, Magritte, Tanguy, and Dalí—examined in the context of surrealist literature, theory, and politics. One course. *Higdon*

177. Twentieth-Century Criticism. Twentieth-century art through the writings of its major proponents from Apollinaire and Roger Fry through Meyer Schapiro and Clement Greenberg to present-day theorists of postmodernism. The definition of modernism and the role of the critic as advocate, mediator, arbiter, and prophet of contemporary trends. One course. *Higdon*

179. Modern Architecture. Major movements in European and American architecture in the nineteenth and twentieth centuries with concentration on major architects and major buildings. Technical and theoretical bases; social and aesthetic implications. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of Director of Undergraduate Studies. Two courses. *Staff*

For Seniors and Graduates

230S. Medieval and Byzantine Art and Architecture. Conceptual, institutional, or stylistic topics. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Staff*

232S. Romanesque and Gothic Art and Architecture. Analysis of an individual topic. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

240. Italian Art. Examination of an individual artist, a particular movement, or the art of an Italian city. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

242S. Studies in Italian Renaissance Art. Specific problems dealing with iconography, style, or an individual master from c. 1300 to 1600. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

243S. Studies in Northern Art. Selected topics such as the Antwerp workshops of the sixteenth century, picturing in Haarlem at the turn of the seventeenth century, or Rubens and Rembrandt. Prerequisite: consent of instructor. One course. *Melion*

262S. Problems in Nineteenth-Century Art. Prerequisite: consent of instructor. One course. *Staff*

276S. Problems in Modern Art. Selected topics in modern art before 1945, with emphasis on major movements of masters. Prerequisite: consent of instructor. One course. *Higdon*

277S. Contemporary Art. Historical and critical principles applied to present-day artists and/or movements in all media since World War II. Prerequisite: consent of instructor. One course. *Higdon*

291, 292. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by consent of Director of Undergraduate Studies. Two courses. *Staff*

293S. Methods of Art History. Approaches to the study of works of art, including connoisseurship, iconology, and stylistic analysis. Prerequisite: consent of instructor. One course. *Staff*

294, 295. Special Problems in Art History. Individual study and research. Two courses. *Staff*

DESIGN

To cover materials supplied in design courses, a fee of \$40 will be charged for each course, payable prior to the beginning of classes.

53. Drawing. Directed approaches to practice in life drawing and in the expression of graphic concepts. One course. *Smith and Stars*

54. Two-Dimensional Design and Color. Experiments in form and color, with work from observation. Introduction to color theory in various media. Prerequisite: Art 53. One course. *Smith*

101, 102. Photography. Emphasis on interaction of technique, perception, and communication in making and responding to photographic images. Students must provide their own hand camera. Prerequisites: submission of portfolio and consent of instructor. C-L: Film. Two courses. *Staff*

103, 104. Painting. Studio practice in painting with individual and group criticism and discussion of important historic or contemporary ideas. Prerequisites: Art 54 or equivalent and consent of instructor. Two courses. *Pratt*

105, 106. Advanced Drawing and Color. Work from life or in formal modes, with emphasis on personal development, through individual and group criticism and discussion. Prerequisites: Art 53 and 54 and consent of instructor. Two courses. *Pratt*

107, 108. Printmaking. Wood engraving, block printing, copperplate engraving, etching, aquatint, and drypoint. Prerequisite: Art 54 or consent of instructor. Two courses. *Staff*

112. Ceramics. Design, production, and conceptualization of three-dimensional forms. Lectures and studio. One course. *Stars*

113. Advanced Studies in Ceramics. Formulation and application of ceramic glazes and firing techniques. One course. *Stars*

114S. Old Master Techniques. Possibilities and limitations in a variety of media including fresco, egg tempera, silverpoint, and others. Prerequisites: Art 53 and 54 or consent of instructor. One course. *Stars*

180S. Theory of Design. Visual thinking and innovations in historical and contemporary art. Formal analysis and discussion of important issues for students involved in creating art. Prerequisites: two courses in design and consent of instructor. One course. *Pratt*

203, 204. Advanced Painting. Prerequisites: Art 53 and 54 and consent of instructor. Two courses. *Pratt*

217, 218. Individual Project. Independent work open to highly qualified seniors on recommendation of instructor and invitation of department. Two courses. *Staff*

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

56. Three-Dimensional Design

109. Figurative Sculpture

110. Sculpture

127. Early Christian Culture: Evidence of Art and Literature

131. Byzantine Art and Architecture

143. Classical Tradition in the Renaissance

144. Central Italian Art

165. Far Eastern Painting

178. History of Photography

181. Pre-Columbian Art and Archaeology

209, 210. Advanced Sculpture

220S. Greek Painting

279S. Problems in Modern Architecture

THE MAJOR

The student will elect a sequence of courses emphasizing either the history of art or design. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

History of Art

Major Requirements. Eight courses in the history of art to include: one course from each of the following areas—ancient, medieval, Renaissance/baroque, and modern; two seminars at the 200 level. For students planning to do graduate work in art history, one of these should be Art 293S. Two years of college level study or the equivalent in French, German, or Italian are strongly recommended. Majors contemplating graduate work in history of art are advised to take more than eight courses in history of art and to gain competence in French and German.

Design

Prerequisites. Art 69 or 70 and one other art history course; Art 53 and 54.

Major Requirements. Five studio courses exclusive of Art 53 and 54.

Asian and African Languages

Major programs are not offered in Asian and African languages. Interested students are encouraged, however, to consider the major in comparative area studies.

ARABIC (ARB)

1, 2. Elementary Arabic. Understanding, speaking, reading, and writing Arabic. Language laboratory. Two courses. *Cooke*

11. Intensive Elementary Arabic I. Instruction for a period of two weeks. Eligibility for Arabic 12, 13, or 14 requires study independently throughout the year following completion of Arabic 11. No prerequisites. Pass/fail. Half course. *Cooke*

12. Intensive Elementary Arabic II. Instruction for a period of two weeks. Eligibility for Arabic 13 or 14 requires study independently throughout the year following completion of Arabic 12. Prerequisite: consent of instructor. Pass/fail. Half course. *Cooke*

13. Intensive Elementary Arabic III. Instruction for a period of two weeks. Eligibility for Arabic 14 requires study independently throughout the year following completion of Arabic 13. Prerequisite: consent of instructor. Pass/fail. Half course. *Cooke*

14. Intensive Elementary Arabic IV. Instruction for a period of two weeks. Prerequisite: consent of instructor. Pass/fail. Half course. *Cooke*

63, 64. Intermediate Arabic. Reading, composition, and conversation in Classical Arabic. Readings include selections from the Qur'an, contemporary literature, and the Arabic press. Two courses. *Cooke*

171S. Modern Arabic Literature in Translation. Taught in English. C-L: Comparative Area Studies. One course. *Cooke*

173S. Women in Arabic Literature. Taught in English. Representative novels, short stories, plays, and poems by writers (mostly female) in the Arab world. C-L: Comparative Area Studies and Women's Studies. One course. *Cooke*

191, 192. Independent Study. Two courses. *Cooke*

CHINESE (CHN)

1, 2. Elementary Chinese. Introduction to speaking, understanding, reading, and writing modern standard Chinese (Mandarin, or *putonghua*, based on the Beijing dialect). One and one-half courses each. *Kunst and staff*

63, 64. Intermediate Chinese. Reading, oral practice, language laboratory. One and one-half courses each. *Kunst*

135, 136. Introduction to Modern Chinese Literature. Prerequisite: Chinese 64 or equivalent. C-L: Comparative Area Studies. Two courses. *Kunst*

171. The Novel in Modern China. Reading and discussion in depth of a selected novel, with its cultural and historical background. Prerequisite: Chinese 136 or equivalent. C-L: Comparative Area Studies. One course. *Kunst*

191, 192. Independent Study. Two courses. *Kunst*

Courses Offered in the Duke Study in China Program at Beijing Teachers College and Nanjing University

111, 112. Intensive Progress in Chinese. Two courses. *Staff*

127. Chinese Conversation and Composition. Discussion based on oral and written reports. Aural comprehension practice. One course. *Staff*

129. Advanced Readings in Chinese. Reading and discussion of selections from the Chinese press, academic writing, Ming-Qing vernacular fiction and drama. One course. *Staff*

193. Directed Study. Reading and research culminating in a paper, on a topic approved and supervised by the resident director. One course. *Davis*

Courses Currently Unscheduled

125, 126. Advanced Chinese

141. Chinese Literature in Translation

HINDI-URDU (HIN)

1, 2. Intensive Elementary Hindi-Urdu. Conversation, basic grammar, and vocabulary; introduction to the Devanagari script and the reading of graded texts. Four hours of classroom work; two hours of language laboratory drill. Two courses. *Silver*

63, 64. Intensive Intermediate Hindi-Urdu. Reading, composition, and conversation. Four hours of classroom work, two hours of language drill. Prerequisite: Hindi-Urdu 1, 2. Two courses. *Silver*

191, 192. Independent Study. Directed reading and research. Open only to students with prior knowledge of Hindi-Urdu. Two courses. *Silver*

JAPANESE (JAP)

1, 2. Elementary Japanese. Introduction to speaking, understanding, reading, and writing. Two courses. *Fowler*

63, 64. Intermediate Japanese. Practice on advanced spoken and written patterns; reading and discussion. Two courses. *Fowler*

155, 156. Readings in Modern Japanese. C-L: Comparative Area Studies. Two courses. *Fowler*

191, 192. Independent Study. Two courses. *Fowler*

Courses Currently Unscheduled

161. Modern Japanese Fiction in Translation

PERSIAN (PER)

1, 2. Elementary Persian. Introduction to spoken and literary Persian: understanding, speaking, reading, and writing. Language laboratory drill. Two courses. *Lawrence*

63, 64. Intensive Intermediate Persian. Four hours of classroom work; two hours of language laboratory drill. Advanced conversation in Iranian Persian, reading, and composition. Prerequisite: elementary Persian. Two courses. *Lawrence*

SWAHILI (SWA)

1, 2. Elementary Swahili. Language instruction through self-instructional mode. Intensive work in language laboratory; drill sessions with native speakers. Emphasis on conversation. Two courses. *W. O'Barr*

63, 64. Intermediate Swahili. Classroom work and language laboratory drill. An advanced study of language and Swahili culture and literature. Two courses. *W. O'Barr*

Astronomy

For courses in astronomy, see Physics.

Biology (BIO)

The introductory biology courses and the biology major are cooperatively administered by the Department of Botany and the Department of Zoology. Additional courses in biosciences are offered by the Departments of Botany and Zoology, and also by the Departments of Anthropology, Chemistry, and Psychology in Trinity College of Arts and Sciences; by the Departments of Anatomy, Biochemistry, Microbiology and Immunology, and Physiology in the School of Medicine; and by the Schools of Engineering and Forestry and Environmental Studies.

10L. Marine Biology. Physical and chemical characteristics of marine ecosystems and the functional adaptations of marine organisms to these systems. Lectures, field trips, and laboratories. For students not majoring in a natural science. Given at Beaufort. C-L: Marine Sciences. One course. *Staff*

14L. Principles of Biology. A one-semester introduction. Lectures and laboratories. One course. *Staff*

Biology 14L is a prerequisite to most courses in botany and zoology. Both Biology 10L and Biology 14L may count for the distributional requirements and for the requirement in empirical science.

THE MAJOR

The Bachelor of Arts and the Bachelor of Science degrees are offered with a major in biology, in botany, in zoology, or in an individually designed interdepartmental concentration approved by the appropriate Director of Undergraduate Studies. The Director of Undergraduate Studies for the biology major is alternately the Director of Undergraduate Studies in botany or zoology.

The Handbook for Biology Majors may be obtained from the office of the Director of Undergraduate Studies for the biology major. For descriptions of courses appropriate for the biology major see courses listed in this bulletin under the Departments of Botany and Zoology and related departments.

For the A.B. Degree

This degree program is the general liberal arts major program. Preprofessional students should elect the degree program leading to the B.S. degree.

Prerequisite. Biology 14L or equivalent.

Corequisites. Botany 145L; Zoology 74L; Chemistry 11, 12; and Mathematics 31.

Major Requirements. A minimum of six courses in the biosciences, not including the above prerequisite and corequisites. The six courses must include one course from three of the following four areas in the Departments of Botany or Zoology: cell biology, genetics, plant or animal ecology, plant or animal physiology. The remaining three courses may be elected from among courses numbered 100 or above in botany, zoology, or in the basic science departments in the School of Medicine, or from approved courses of a basic biological character in related departments.

For the B.S. Degree

This is the preprofessional program in biology.

Prerequisite. Biology 14L or equivalent.

Corequisites. Botany 145L; Zoology 74L; Chemistry 11, 12, and 151; Mathematics 31, 32, or 34; Physics 51, 52; Biochemistry 227 or Chemistry 175.

Major Requirements. A minimum of six courses in the biosciences, not including the prerequisite and corequisites, as specified for the A.B. degree, except that at least one of the courses must be at the 200 level. At least one semester of independent study is recommended.

For Departmental Majors and Interdepartmental Concentrations

See major requirements under Botany and Zoology for botany majors and zoology majors, respectively. For an individually designed interdepartmental concentration (e.g., in cell and molecular biology, physical biology, marine biology) see the Directors of Undergraduate Studies who can help arrange for such programs. See major requirements under Chemistry for a specialization in biological chemistry.

Honors

The botany and zoology departments offer a program for graduation with distinction in biology. See the section on honors in this bulletin. Students interested in pursuing an honors program should consult the Director of Undergraduate Studies for the biology major.

Botany (BOT)

Professor W. Culberson, *Chairman*; Associate Professor Christensen, *Director of Undergraduate Studies*; Professors Antonovics, Barber, Boynton, Johnson, Searles, Stone, Strain, White, and Wilbur; Associate Professors Knoerr, Ramus, Schlesinger, and Siedow; Assistant Professors Johnston and Mishler; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Adjunct Professor C. Culberson; Adjunct Assistant Professor Patterson

The introductory course is Principles of Biology. It is listed under Biology in this bulletin.

43. Ecology and Society. Ecological concepts and their application to human society. Intended for students interested primarily in social sciences and humanities. One course. *Staff*

51L. Culture and Propagation of Plants. The principles of plant growth and development, as exemplified in horticulture. One course. *W. Culberson*

53. Introductory Oceanography. Basic principles of physical, chemical, biological, and geological oceanography. C-L: Geology 53. One course. *Pilkey and Searles*

75. Plants of the Southeast. Survey of the flora, stressing biological and geological factors related to present-day floristic and evolutionary patterns. One course. *Christensen or Stone*

90. Plants and Man. The biological nature of crop plants, the world's major economic plants, and the origins and evolution of agriculture. One course. *Staff*

102. Trees and Shrubs of North Carolina. Identification and natural history of the trees, shrubs, and woody vines. Emphasis on those cultivated and occurring naturally in North Carolina. One course. *Wilbur*

103L. General Microbiology. Classical and modern principles of the structure, physiology, and genetics of microorganisms and their roles in human affairs. Prerequisite: one course in a biological science or consent of instructor. C-L: Microbiology and Immunology 103L. One course. *Johnson and Wheat*

114L. Introduction to Biological Oceanography. Laboratory emphasis. Not open to students who have had Geology 53 or Botany 53. Prerequisite: introductory biology. See C-L: Zoology 114L; also C-L: Marine Sciences. Given at Beaufort. One course (spring); one and one-half courses (summer). *Barber, Ramus, and staff*

115L. Phytoplankton. Taxonomy, physiology, and community ecology of these life forms and their role in the biology of the seas. Laboratory and field exercises

emphasize techniques of the biological oceanographer. Prerequisite: introductory biology. Given at Beaufort. One course. *Ramus*

142L. Plant Systematics. Surveys major groups. Principles of vascular plant taxonomy with practice in identification of local flora. Lectures, laboratories, and field trips. One course. *Wilbur*

145L. Plant Diversity. Major groups of the living plants, their evolutionary origins and phylogenetic relationships. Prerequisite: introductory biology. C-L: Botany 245L. One course. *White or Searles and Wilbur*

146L. Ecology of Plants. Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: introductory biology and one other course in biology. C-L: Botany 246L. One course. *Christensen, Schlesinger, or Strain*

151L. Plant Physiology. Principal physiological processes of plants, including respiration, photosynthesis, water relations, and factors associated with plant morphogenesis. Prerequisites: introductory biology and one year of chemistry; organic chemistry is desirable. C-L: Botany 251L. One course. *Siedow*

160L. Plant Anatomy. A comparative study of basic cell types, tissues, and organs of vascular plants. Correlation of anatomical information with pertinent literature, application of anatomy to problems in systematics and evolution, and the interrelationship between structure and function. Prerequisite: plant diversity or consent of instructor. C-L: Botany 260L. One course. *White*

167. Analysis of Marine Ecosystems. Prerequisites: Biology 14L and Chemistry 12. See C-L: Zoology 167; also C-L: Marine Sciences. Given at Beaufort. One course. *Barber*

180. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisites: introductory biology and Chemistry 12 and Mathematics 31 or equivalents. C-L: Botany 280, Genetics—The University Program, Zoology 180, and Zoology 280. One course. *Antonovics, Boynton, and Gillham*

191, 192. Independent Study. Directed reading and research. Open to qualified students in the junior and senior years by consent of department. C-L: Marine Sciences. Credit to be arranged. *Staff*

193T, 194T. Tutorial in Botany. Credit to be arranged. *Staff*

195S.04. Light in the Sea. Properties of light in the sea and the biological consequences; orientation, bioluminescence, biological rhythms, primary production, and sensing devices. Given at Beaufort. Half course. *Ramus*

195S, 196S. Seminar in Botany. Credits to be arranged. *Staff*

For Seniors and Graduates

205. Molecular Biology and Genetics. Molecular aspects of gene expression and cell differentiation; application of recombinant DNA techniques to basic and applied problems. Prerequisites: organic chemistry and cell biology or genetics. One course. *Johnston*

209L. Lichenology. Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. One course. *C. Culberson and W. Culberson*

210L. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. One course. *Mishler*

212L. Phycology. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. One course. *Searles*

215L. Primary Productivity in the Seas. The biological flux of carbon in the coastal and open seas involving phytoplankton, seaweeds, seagrasses, and marshgrasses. The contributions of these primary producers to food chain processes and global atmospheric-sedimentary cycles, as well as the ecological consequences of variations in photosynthetic mechanisms. Prerequisites: introductory biology and introductory chemistry. C-L: Marine Sciences and Zoology 215L. Given at Beaufort. One course. *Barber and Ramus*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: a course in general ecology. C-L: Forestry and Environmental Studies 218 and Marine Sciences. Given at Beaufort. One and one-half courses. *Leatherman (visiting summer faculty)*

219L. Benthic Marine Algae. Morphology, reproduction, life histories, systematics, and natural history of seaweeds. Lectures, laboratories, and field work in ocean and estuaries. Prerequisite: introductory biology; plant diversity recommended. C-L: Marine Sciences. Given at Beaufort. One course. *Searles*

221L,S. Mycology. Seminar. Field and laboratory study of vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in local flora. Prerequisite: one year of biological science. One course. *Johnson*

225T, 226T. Special Problems. Students with adequate training may do special work in the fields listed below. Credit to be arranged.

2. Genetics. *Antonovics*
3. Biological Oceanography. *Barber*
4. Genetics. *Boynton*
5. Ecology. *Christensen*
6. Lichenology. *W. Culberson*
7. Bacteriology; Mycology. *Johnson*
8. Molecular Botany. *Johnston*
9. Systematics and Bryology. *Mishler*
10. Phycology. *Ramus*
11. Ecology. *Schlesinger*
12. Phycology. *Searles*
13. Physiology. *Siedow*
14. Systematics of Flowering Plants. *Stone*
15. Ecology. *Strain*
16. Anatomy and Morphology of Vascular Plants. *White*
17. Systematics and Taxonomy of Vascular Plants. *Wilbur*

227. Introductory Biochemistry I: Intermediary Metabolism. Chemistry of the constituents of proteins, lipids, carbohydrates, and nucleic acids and their metabolic interrelationships. Prerequisite: organic chemistry. C-L: Biochemistry 227. One course. *Fridovich and Rajagopalan*

228. Introductory Biochemistry II: Biological Macromolecules. Prerequisite: Biochemistry 227 or equivalent. C-L: Biochemistry 228. One course. *Greenleaf and Webster*

232. Microclimatology. C-L: Forestry and Environmental Studies 232. One course. *Knoerr*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Zoology 237L. One course. *Lundberg and Mishler*

250L, S. Plant Biosystematics. Descriptive and experimental procedures used to assess systematic implications of vascular plant evolution. Laboratory, discussion, and field-oriented problems. Prerequisites: basic courses in systematics and genetics. One course. *Stone*

253. Biophysical Plant Physiology. Application of physical principles to such processes as ion transport, water relations, and the interconversion of energy in plant cells. Prerequisites: Botany 151L and Mathematics 32 or equivalent. One course. *Siedow*

258. Physiology of Growth and Development. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation at the cellular, tissue, and organ level in plants. Lectures. Prerequisite: Botany 151L or equivalent; organic chemistry recommended. One course. *Naylor*

261. Photosynthesis. Principles of photosynthesis: developmental, mechanistic, regulatory, and ecological aspects of the photosynthetic process. Prerequisite: Botany 151L or 251L. One course. *Siedow*

263L. Tropical Seaweeds. Collection, preservation, description, identification, illustration, and descriptive ecology. Two-week field study on Andros Island in the Bahamas. Prerequisite: Botany 145L or equivalent or consent of instructor. C-L: Marine Sciences. Half course. *Searles*

265L. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Botany 146L and 151L or equivalents. One course. *Strain*

267L. Plant Community Ecology. Concepts and methods of plant synecology. Introduction to the plant communities of the Southeast. Prerequisites: Botany 142L and 146L or equivalents and consent of instructor. One course. *Christensen*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Biochemistry 268 and Microbiology and Immunology 268. One course. *Modrich and staff*

269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Microbiology and Immunology 269, and Zoology 269. One course. *McClay and staff*

272. Ecosystem Analysis. Current problems and progress in studies of terrestrial systems and the biosphere, including energy flow and mineral cycling processes. Prerequisite: Botany 146L. One course. *Schlesinger*

285S. Ecological Genetics. Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Botany 180 and 286 or equivalents. C-L: Genetics—The University Program. One course. *Antonovics*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisite: Zoology 74L or a course in genetics. C-L: Zoology 286 and Genetics—The University Program. One course. *Antonovics, Uyenoyma, and H. Wilbur*

287. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Zoology 287. One course. *Mishler and Roth*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life-cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and weekend field trips. Prerequisites: calculus and ecology and consent of instructor. C-L: Zoology 293L. One course. *Antonovics and H. Wilbur*

295S, 296S. Seminar. Credit to be arranged. *Staff*

COURSES CURRENTLY UNSCHEDULED

243S. Classification of Angiosperms

283. Extrachromosomal Inheritance

MARINE LABORATORY

Botany 114L, 191, 192, 215L, 218, and 219L are offered during the summer at the Duke University Marine Laboratory, Beaufort, North Carolina. The Department of Botany also participates in the semester programs at the Marine Laboratory. See Marine Sciences in this bulletin and consult the *Bulletin of Duke University: Marine Laboratory* for further information.

THE UNIVERSITY PROGRAM IN GENETICS

Courses offered by the Department of Botany are an integral part of this inter-departmental program. Refer to the announcement in this bulletin under Genetics—the University Program, for a listing of other offerings.

THE MAJOR

For the A.B. Degree

This degree program is the general liberal arts major program. Preprofessional students should elect the bachelor of science degree program.

Prerequisite. Introductory college biology or advanced placement in botany.

Corequisites. Two courses in introductory chemistry (Chemistry 11, 12) or advanced placement in chemistry; one course in college mathematics or equivalent.

Major Requirements. A minimum of eight approved botany or closely related science courses, in addition to the prerequisite and corequisites: including 145L (plant diversity) and at least four courses selected from the following: 142L (plant systematics), 146L (plant ecology), 151L (plant physiology), 160L (plant anatomy), and 180 (principles of genetics); and one course in zoology (animal diversity or any course numbered 100 or above). The Director of Undergraduate Studies must approve the selection of any science courses in related departments to be included in the eight courses for the major. Students' programs are tailored to their interests and plans for the future.

For the B.S. Degree

This degree program is recommended for all preprofessional students.

Prerequisite. Introductory college biology or advanced placement in botany.

Corequisites. Chemistry through one semester of organic and one semester of biochemistry, two courses in college mathematics or equivalent, and one year of college physics.

Major Requirements. Eight science courses as described under major requirements for the A.B. degree with the exception of the one course in zoology. A course in

statistics is recommended. The emphasis in this preprofessional program will depend on the student's interests; each program is arranged on an individual basis.

For the Interdepartmental Concentration and Biology Major

An interdepartmental program (e.g., in cell and molecular biology, physical biology, and marine biology) may be pursued instead of a departmental major. The appropriate Director of Undergraduate Studies in botany or zoology can help arrange for such programs. See requirements under Biology for a biology major.

Honors

The department offers a program for graduation with distinction in botany. See the section on honors in this bulletin. The program is usually initiated during the junior year and involves participation in at least two semesters of independent study (Botany 191, 192). The research paper which results from this experience is submitted to a departmental committee for review, followed by a discussion of the paper with the student. On the basis of the quality of the research report and the student's performance in the discussion of it, the committee may recommend the student for graduation with distinction in botany.

Canadian Studies Program

Professor Leach, *Director*

The program in Canadian studies seeks to provide the student with an understanding of Canada and its problems and prospects. Students may undertake the program to supplement another major, or to complete a second major in Canadian studies, or as part of an interdepartmental concentration, or under Program II. See sections below on the program and the major. The courses are described in the departmental and interdisciplinary listings.

COURSES WITH FULL CANADIAN CONTENT

The following courses count as one full course in the four required for the program in Canadian studies and in the eight required for the major in Canadian studies:

English

186. Canadian Literature in English. *Staff*

Interdisciplinary Courses

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Comparative Area Studies, Economics 184, History 184, Political Science 184, and Sociology 184. *Leach* 282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Comparative Area Studies, History 282S, Political Science 282S, and Sociology 282S. *Leach*

COURSES WITH SIGNIFICANT CANADIAN CONTENT

Two of these partial content courses may count as one full course among the four required for the program in Canadian studies and among the eight required for the major in Canadian studies, but no more than two partial content courses may be counted as full content courses in this way. All other partial content courses may count only for a half credit for Canadian studies majors and programs.

Anthropology

204S. The Anthropology of Cities. *Fox or Smith*

Economics

154. Aggregate Economics. *Tower*

265S. International Trade and Finance. By special arrangement this course may be counted as a full content course. *Tower*

Education

100. Social and Philosophical Foundations of Education. *DiBona*

Forestry and Environmental Studies

194. Conserving Natural Resources. *Royer*
283. Environmental Policy and Values. *Royer*

French

114. Language and Civilization of Quebec. *Staff*
131S. French in the New World. *Hull*
132. Literature and History of Quebec. *Staff*
169. The Contemporary Novel in French Canada. *Tetel*

History

- 167S. United States and Canadian Constitutional Issues. *Cahow*
183S. Canada from the French Settlement. *Cahow*
215-216. The Diplomatic History of the United States. *C. Davis*

Law

260. Seminar on the Law of the Sea. *Robertson*

Music

74. Introduction to Jazz. *Jeffrey*

Political Science

175. Political Parties and Legislatures in Western Democracies. *Kornberg*
195. Comparative Political Behavior in the United States and Canada. *Kornberg*
293. Federalism. *Leach*

Sociology

170. Mass Communication. *Smith*
179. Sociology of Nationalism. *Tiryakian*

THE PROGRAM

In the Canadian Studies Program a student must take four courses with Canadian content or their equivalents. These must include Interdisciplinary Course 184. It is recommended that students who do not have the equivalent of two years of college level French should take French 181 and 182, Intensive French.

THE MAJOR

Corequisite. Completion of another major.

Major Requirements. Eight courses in Canadian studies, including Interdisciplinary Course 184 and seven other semester-course credits in courses on Canada with full or significant content at the 200 level, or approved independent study, or special reading courses. Two of the courses with significant Canadian content may count as half courses to make up the eight required courses. No more than two courses required for the first major may be counted for the Canadian studies major.

To complete the major in Canadian studies a student must also take at least two full years of college level French, or must possess an equivalent competence in the language as certified by the Department of Romance Languages.

Chemistry (CHM)

Professor Lochmüller, *Chairman*; Professor Wilder, *Director of Undergraduate Studies*; Professor Bonk, *Supervisor of Freshman Instruction*; Professors Arnett, Chesnut, Fraser-Reid, Jeffs, Krigbaum, A. McPhail, Palmer, Poirier, Porter, Quin, Smith, Strobel, and Wells; Associate Professors Baldwin, Crumbliss, Henkens, and Shaw; Assistant Professors Anderson, R. MacPhail, and Sternbach; Professors Emeriti Bradsher, Brown, Gross, Hobbs, and Vosburgh; Adjunct Professors Ghirardelli, Pitt, and Spielvogel; Adjunct Assistant Professor Switzer

Courses with laboratories include fifty to sixty hours of laboratory work per term.

11, 12. Principles of Chemistry. The introductory course for students who intend to take additional chemistry courses other than Chemistry 103. 11: emphasizes stoichiometry and atomic and molecular structures. 12: emphasizes thermodynamics, chemical kinetics, synthesis, and analysis. Laboratory work includes both qualitative and quantitative analysis. Prerequisites: one year of high school chemistry or consent of instructor and qualification for Mathematics 31. Two courses. *Bonk and staff*

41, 42. Chemical Fundamentals. Generally paralleling Chemistry 11, 12, but enriched and discussion-oriented for selected able potential science majors. Laboratory. Prerequisite: consent of instructor; for 42: Chemistry 11 or 41. Two courses. *R. MacPhail, A. McPhail, and Strobel*

103. Chemistry and Society. Past discoveries and current challenges: a chemical background for decisions involving energy, radiation, pollution, drugs, food additives, vitamins, and pesticides. For students not majoring in a natural science or continuing in chemistry. Not open to students having credit for Chemistry 11 or equivalent. One course. *Poirier, Wells, and staff*

117. Inorganic Chemistry. Bonding, structures, and reactions of inorganic compounds studied through physical chemical concepts. Prerequisite: Chemistry 161. One course. *Crumbliss, Palmer, and Wells*

118. Advanced Laboratory. Advanced laboratory course incorporating techniques from analytical, biological, inorganic, organic, and physical chemistry. Laboratory. Prerequisite: consent of instructor. One course. *Staff*

132. Quantitative and Instrumental Analysis. Practice in advanced quantitative analysis and in the use of chemical instrumentation. Theoretical and applied aspects of chemical and instrumental methods. Laboratory. Prerequisite: Chemistry 161. One course. *Anderson, Lochmüller, and Strobel*

151, 152. Organic Chemistry. The structures and reactions of the compounds of carbon. 151 laboratory: techniques of separation and structure determination. 152 laboratory: organic reactions and preparations. Prerequisite: Chemistry 12 or 42 or consent of Director of Undergraduate Studies; for 152: Chemistry 151. Two courses. *Arnett, Baldwin, Fraser-Reid, Jeffs, Porter, Quin, Sternbach, and Wilder*

151M, 152M. Organic Chemistry. The structures and reactions of the compounds of carbon. The courses, principally for majors, are similar to 151 and 152, but are taught in a more interactive format made possible by a marked reduction in class size. The M suffix will not appear on the transcript. Laboratory. Prerequisite: Chemistry 12 or 42 and consent of the instructor; for 152M: Chemistry 151 or 151M. Two courses. *Arnett, Baldwin, Fraser-Reid, Jeffs, Porter, Quin, Sternbach, and Wilder*

152P. Preceptorial. Elective for students in Chemistry 152. Laboratory. Prerequisite: consent of instructor. *Staff*

155. Intermediate Organic Chemistry: Spectral, Structural, and Synthetic. Advanced study of spectral properties of organic compounds, the influence of structure on reactivity, and important synthetic methods in organic chemistry. Laboratory work emphasizes both synthetic methods and the systematic identification of compounds by their spectral and chemical properties. Prerequisite: Chemistry 152. One course. *Baldwin, Fraser-Reid, and Quin*

161. Physical Chemistry. Fundamentals of theoretical chemistry with particular emphasis on chemical thermodynamics and kinetics. Laboratory. Prerequisites: Chemistry 152 and Physics 52 and Mathematics 32 or 34. One course. *Chesnut, Henskens, Krigbaum, R. MacPhail, A. McPhail, Poirier, and Smith*

162. Physical Chemistry. Fundamentals of theoretical chemistry with particular emphasis on quantum chemistry, molecular structure, and molecular spectroscopy. Laboratory. Prerequisites: Chemistry 161 and either Mathematics 103 or 105 or consent of instructor. One course. *Chesnut, Henkens, Krigbaum, R. MacPhail, A. McPhail, Poirier, and Smith*

175. Molecular Basis of Biological Processes. A survey of the structures, reactions, and mechanisms of action of important biological molecules. Prerequisite: Chemistry 152. One course. *Shaw*

176. Biophysical Chemistry. The physical chemistry of and experimental methods employed in the study of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisites: Chemistry 161 and 175. One course. *Henkens*

191, 192. Independent Study. Supervised reading and research. Prerequisite: consent of Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Supervised reading and research. Prerequisites: Chemistry 191, 192, and consent of Director of Undergraduate Studies. Two courses. *Staff*

195S, 198S. Seminar. Topics from various areas of chemistry, changing each year. For example: organic chemistry of biologically important compounds, chemical basis of pharmacology, metal ions in biological systems. Open to senior chemistry majors or by consent of instructor. Two courses. *Staff*

196S. Seminar. Selected topics in physical chemistry of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisites: Chemistry 161 and 175. One course. *Henkens and Shaw*

197S. Seminar. Special topics in biological chemistry (e.g., immunochemistry, molecular biology). Prerequisite: Chemistry 161; Chemistry 175 recommended. One course. *Staff*

For Seniors and Graduates

201. Molecular Spectroscopy. Selected spectroscopic methods in the study of molecular structure. Symmetry and group theoretical basis for selection rules, theories of magnetic and optical resonance, and interpretation of spectra; examples from both inorganic and organic chemistry. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

203. Quantum Chemistry. Basic principles of quantum and group theoretical methods. Topics include symmetry, a review of the fundamentals, and the mathematical foundations of quantum theory. Emphasis on the application of molecular orbital theory to organic and inorganic systems. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

205. Structure and Reaction Dynamics. Structure and mechanisms in organic and inorganic compounds, substitution reactions, linear free energy relations, and molecular rearrangements. Emphasis on the use of kinetic techniques to solve problems in reaction mechanisms. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

207. Principles of Kinetics, Thermodynamics, and Diffraction. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

209. Advanced Chemistry. A combination of three one-third course segments from Chemistry 201, 203, 205, and 207. Interested students should consult the Director

of Undergraduate Studies for scheduling. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

275, 276. Advanced Studies. (1) Analytical chemistry, (2) inorganic chemistry, (3) organic chemistry, and (4) physical chemistry. Open to especially well-prepared undergraduates by consent of Director of Undergraduate Studies. Two courses. *Staff*

THE MAJOR

Differing major programs are offered under the baccalaureate degrees. The Bachelor of Arts degree programs permit greater flexibility in allowing students to select an area of concentration while satisfying the junior-senior small group learning experience requirements through seminar courses (option one) or through independent study in chemistry or related departments (option two). Of special significance is the area of biological chemistry; under the direction of the biological chemistry program coordinator, students may specialize in this area with either seminars (option three) or independent study in chemistry or related departments (option four) satisfying the junior-senior small group learning experience requirement. The Bachelor of Science degree program provides in-depth preparation for graduate study in chemistry; it is accredited by the American Chemical Society.

For the A.B. Degree

Prerequisites. Chemistry 11, 12; or Chemistry 41, 42; or advanced placement. Mathematics 31, 32 (or 33, 34); Physics 51, 52.

Major Requirements. Chemistry 132, 151, 152, 161, *plus* one of the following options:

1. Two of the following: Chemistry 117, 155, 162, 175, 176, 195S, 196S, 197S, 198S.
2. One of the following: Chemistry 117, 155, 162, 175; *plus* Chemistry 191, 192 or the equivalent in a natural science, in mathematics, engineering, or in a basic science department in the School of Medicine.
3. Chemistry 175, 195S or 197S, and 176 or 196S.
4. Chemistry 175 and 176; and Chemistry 191, 192 in a biochemically related area, or the equivalent in a biological area, biomedical engineering, or basic science department in the School of Medicine.

Recommendations. Computer Science 51 or Engineering 51, Mathematics 103 or 105 (for options one and two); Chemistry 162; two courses in a foreign language or the equivalent. Students planning graduate study are advised to take these recommended courses and to consult with advisers regarding appropriate additional courses.

For the B.S. Degree

Prerequisites. Chemistry 11, 12; or Chemistry 41, 42; or advanced placement. Mathematics 31, 32 (or 33, 34); 103 (or 105); Physics 51, 52; two courses in German or Russian or the equivalent.

Major Requirements. Chemistry 117, 132, 151, 152, 161, 162, *plus* four of the following courses: Chemistry 118, 155, 175, 176, 191, 192, 195S, 196S, 197S, 198S, 201, 203, 205, 207, 209, 275, or 276, with at least two being selected from the laboratory courses 118, 155, 191, 192. In an exceptional case and with the prior approval of the Director of Undergraduate Studies, a student may substitute one advanced level nonindependent study course, or a two-course independent study sequence, in an appropriate science department in Trinity College, the School of Engineering, or the School of Medicine for one of the two optional nonlaboratory chemistry courses. A course directly paralleling one offered by the chemistry department may not be substituted. Chemistry 201, 203, 205, and 207 are offered also in one-third semester segments; in

some instances a student may wish to take some combination of three of these segments by registering for Chemistry 209. Additional details may be obtained from the Director of Undergraduate Studies.

Recommendations. Computer Science 51 or Engineering 51; Mathematics 104; Physics 100. Students planning graduate study in chemistry should consult with advisers regarding appropriate additional courses.

Honors

The department offers a program for graduation with distinction in chemistry. See the section on honors in this bulletin. The program involves two semesters of independent study, taken either in the chemistry department (Chemistry 191, 192), or as part of the biological chemistry program with the consent of the program coordinator. A research paper based upon the independent study and nomination by the research supervisor form the basis for consideration by a departmental committee. The committee may recommend the student for graduation with distinction in chemistry. Additional details may be obtained from the Director of Undergraduate Studies.

Chinese

For courses in Chinese, see Asian and African Languages.

Classical Studies (CS)

Professor Richardson, *Chairman*; Associate Professor Stanley, *Director of Undergraduate Studies*; Professors Newton, Oates, and Willis; Associate Professors Burian, Rigsby, and Younger; Assistant Professor Boatwright; Visiting Professor Michels

The essential purpose of classical studies is to increase knowledge and understanding of the roots of Western culture in the civilizations of Greece and Rome. Towards this aim, the department offers courses and majors in three areas: Latin, Greek, and classical studies. Concentration in the languages offers students the unique experience of exploring at first hand the literature, history, and thought of antiquity. In the process, students will gain a deeper insight into language itself, as well as an appreciation of the problems of interpretation and the varieties of evidence upon which interpretation may be based. For students interested in history, ancient art, or archaeology, courses in classical studies offer a means of assessing the intentions and achievements of the record, the culture, and the material remains of Greece and Rome in their own rich and varied context.

A secondary aim is, and has been by a centuries-old tradition, the development of a keener perception and understanding of the cultural forces at work in the contemporary world. As a result, the field of classical studies is a valuable and respected foundation for advanced work in other academic disciplines as well as professional programs in law, medicine, and finance.

GREEK (GRK)

1-2. Elementary Greek. A study of grammar and an introduction to reading. Two courses. *Willis*

11-12. Elementary Modern Greek. An introduction to literary and conversational demotic Greek. Two courses. *Younger*

63, 64. Intermediate Greek. Introduction to Greek prose and poetry. 63: Plato's *Republic*. 64: Homer's *Odyssey*. Two courses. *Rigsby*

103S, 104S. Studies in Greek Literature. 103S: the literature of classical Athens. 104S: the literature of archaic Greece. Two courses. *Burian*

203. Homer. Problems of language and structure in the *Iliad*; present state of Homeric scholarship. One course. *Stanley*

205. Greek Lyric Poets. Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. One course. *Burian*

206. Aeschylus. The *Oresteia*, with study of the form of *Agamemnon* and its place in the design of the trilogy. One course. *Willis*

226. Orators. Selections from the principal Attic orators, with emphasis on Lysias and Demosthenes. One course. *Willis*

Courses offered each year on demand in consultation with the Director of Undergraduate Studies:

87, 88. Sight Reading in Greek Prose. Readings from easy Attic prose writers. Prerequisites: one year of college Greek or the equivalent and consent of instructor. Two half courses. *Staff*

117T. Greek Prose Composition. The course content is determined by the needs of the students enrolled. One course. *Willis*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. Two courses. *Staff*

193, 194. Directed Research in Greek. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. Two courses. *Staff*

Note: Greek 181S, 182S are offered each summer. They provide an intensive introduction to the language and literature. Prerequisite: proficiency in another language. Two courses each. Staff.

Courses Currently Unscheduled

209. Euripides

210. Aristophanes

221. Early Greek Prose

222. Thucydides

LATIN (LAT)

1-2. Elementary Latin. Study of the structure of the language (forms, vocabulary, syntax, and pronunciation); selected readings in prose and poetry. Two courses. *Stanley*

63, 64. Intermediate Latin. Introduction to Latin prose and poetry. 63: selected prose. 64: readings from Vergil's *Aeneid*. Two courses. *Boatwright*

103S, 104S. Studies in Latin Literature. 103S: the Late Republic. 104S: the Age of Augustus. Two courses. *Newton*

105S. Ovid: The Metamorphoses. The poem studied as representative of Ovid's varied narrative art, as the largest-scale Roman treatment of classical myths, and in the light of the distinctively Ovidian attitude toward Augustanism. One course. *Newton*

106S. Roman Satire. A survey of the genre with concentration on Horace and Juvenal. One course. *Richardson*

151S. Cicero. One course. *Richardson*

202. Early Latin. Representative authors and inscriptions from the early years of the Roman Republic. One course. *Richardson*

203. Epic: Vergil. The *Aeneid*. One course. *Newton*

215. The Historians. Representative historians, including one or more of the following: Livy, Caesar, Sallust, Tacitus. One course. *Richardson or Boatwright*

221. Medieval Latin. Selected works of the Latin Middle Ages from Prudentius to the humanists: genres studied usually include the hymn, sequence, drama, lyric, saints' lives, chronicle, epic, and epistle. C-L: Medieval and Renaissance Studies. One course. *Newton*

Courses offered each year on demand in consultation with the Director of Undergraduate Studies:

87, 88. Sight Reading in Classical, Medieval, and Renaissance Latin. Offered especially for students in fields other than classical studies who wish to maintain and refresh their Latin. (Open to students enrolled in other courses in Latin only on the recommendation of their instructors.) C-L: Medieval and Renaissance Studies. Two half courses. *Staff*

117T. Latin Prose Composition. The course content is determined by the needs of the students enrolled. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open to qualified juniors and seniors. Two courses. *Staff*

193, 194. Directed Research in Latin. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. Two courses. *Staff*

Note: The designation of Latin 100 applies to one course credit given for advanced placement which will be awarded for scores of 4 or 5 on one or more of the College Board Advanced Placement tests in Latin. One course credit may be earned by a score of 3 if the student successfully completes one further semester of Latin.

Latin 181S, 182S are offered each summer. They provide an intensive introduction to the language and literature. Prerequisite: proficiency in another language. Two courses each. Staff.

Courses Currently Unscheduled

112S. Comedy

115S. Tacitus

153S. Petronius

201. The Verse Treatise

204. Epic

210. Lyric and Occasional Poetry

211. Elegiac Poets

CLASSICAL STUDIES (CS)

11. Greek Civilization. The culture of the ancient Greeks from the Bronze Age to Alexander the Great: art, literature, history, philosophy, and religion. Not open to students who have had Classical Studies 53 or History 53. One course. *Rigsby*

11S. Greek Civilization. Same as Classical Studies 11, but in seminar format. One course. *Staff*

12. Roman Civilization. The culture of the ancient Romans from their beginnings to Constantine: art, literature, history, philosophy, and religion. Not open to students who have had Classical Studies 54 or History 54. One course. *Rigsby*

12S. Roman Civilization. Same as Classical Studies 12, but in seminar format. One course. *Staff*

53. Greek History. The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. Not open to students who have had Classical Studies 11. C-L: History 53. One course. *Boatwright*

54. Roman History. The Roman Republic and Empire to the Council of Nicaea. Not open to students who have had Classical Studies 12. C-L: History 54. One course. *Boatwright*

57S, 58S. Seminar in Classical Studies. Aspects of the history, art, and literature of classical Greece and Rome. For freshmen and sophomores. Two courses. *Staff*

63. The Epic. Reading in translation of major epics from antiquity and the Middle Ages, such as *Gilgamesh*, Homer's *Iliad* and *Odyssey*, Vergil's *Aeneid*, and *Beowulf*. One course. *Burian*

64. The Drama. Reading in translation of Greek and Roman tragedies (Aeschylus, Sophocles, Euripides, Seneca) and comedies (Aristophanes, Menander, Plautus, Terence). C-L: Drama 64. One course. *Burian*

115. The Classical Tradition. The notion of the "classical" from the creation of the archetype to the present. One course. *Burian*

117. Ancient Mythographers. Myth in classical and medieval writers from Hesiod to Boccaccio. C-L: Medieval and Renaissance Studies. One course. *Newton*

119. The Augustan Age. Major works of some of Rome's greatest writers (including Vergil, Horace, Livy, and Ovid), studied in translation, and the culture of the period (44 B.C. to 14 A.D.). One course. *Newton*

125. Greek Art and Archaeology. Greek architecture, sculpture, and painting from the Bronze Age to the classical period. Study of objects in the Duke classical collection. One course. *Younger*

126. Roman Art and Archaeology. Roman achievement in architecture, decoration, portraiture, and relief sculpture, from the Villanovans to the Antonine emperors. One course. *Younger*

133. Early Greece and the Near East. Political, social, and intellectual developments from the world of Homer to the Persian Wars. C-L: History 100. One course. *Oates*

134. The Athenian Empire. Imperial democracy at Athens and its consequences for the *polis*. C-L: History 125. One course. *Oates*

135. Alexander the Great. His career and the effects of his conquests. C-L: History 126. One course. *Oates*

137. The Roman Revolution. Rome from the time of the Gracchi to the death of Augustus. C-L: History 103. One course. *Oates*

138. The Decline and Fall of the Roman Empire. From the reign of Nero to the period of Justinian. C-L: History 152. One course. *Oates*

145. Rome: History of the City. The development of the urban plan and its major monuments through the ages; the influence of the ancient Republic and Empire, the

Papacy, and the modern secular state; change and continuity in artistic forms and daily life. Taught on site in Italy. One course. *Burian*

147. Ancient Greece. On-site study of the cultures in Greece from Neolithic to Medieval, concentrating on Athens, the Peloponnese, Crete, and the Cyclades. Prerequisite: Classical Studies 11 or 53 or 125 or 126 or History 53 or consent of instructor. One course. *Younger*

155. The Aegean Bronze Age. Application of archaeological techniques and procedures to problems in the development of the Minoan and Mycenaean civilizations. One course. *Younger*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. Two courses. *Staff*

193, 194. Directed Research in Classical Studies. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. Two courses. *Staff*

195S, 196S. Junior Seminar in Classical Studies. The subject will vary each year according to the interest of the instructor. Two courses. *Staff*

197S. Readings in Classical Philology. Supplementary material, primary and secondary, not covered in students' previous work. Open only to majors in Latin, Greek, or classical studies. One course. *Staff*

236S. Roman Painting. The techniques, iconography, and use in decoration. One course. *Richardson*

256. The Fourth Century through Alexander. One course. *Rigsby*

258. Social and Cultural History of the Graeco-Roman World. One course. *Staff*

261. The Roman Revolution, 146-30 B.C. One course. *Rigsby*

Courses Currently Unscheduled

99. Perspectives in Archaeology

127. Early Christian Culture: Evidence of Art and Literature

144. Ancient Cities: Rome and Its Colonies

146. City and Country in Ancient Italy

156. Principles of Archaeology

161S. Athens

162S. Pompeii

231S. Greek Sculpture

232S. Greek Painting

233. Greek Architecture

234. Roman Sculpture

235S. Roman Architecture

THE MAJOR

Students may choose first or second majors in Greek, Latin, or in classical studies (ancient history or archaeology).

Students majoring in either Greek or Latin who contemplate graduate work are reminded of the necessity for competence in both languages and a reading knowledge of French and German for all higher degrees.

Prospective second majors in Latin, Greek, or classical studies are urged to consult with the Director of Undergraduate Studies at the earliest feasible time, preferably by the sophomore year.

Majors are eligible for nomination to one semester during their junior year at the Intercollegiate Center for Classical Studies in Rome, of which Duke University is a founding member, at a cost comparable to that of a semester at Duke. Financial arrangements are made through the University, and students may apply for scholarship assistance. Courses in Greek, Latin, ancient history, and archaeology taken at the center are counted toward the major requirements. For further information, see the section on study abroad.

Greek

Prerequisite. Greek 2 or equivalent.

Major Requirements. Six courses in Greek above the level of Greek 12 and Classical Studies 197S. In addition, students will be required to pass an examination testing proficiency in Greek composition or to complete Greek 117. Students entering with three or more years of ancient Greek are urged to consult with the Director of Undergraduate Studies to develop a program suited to their specific needs and interests.

Related Work. Greek majors normally take at least four courses in Latin and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

Latin

Prerequisite. Latin 64 or equivalent.

Major Requirements. Six courses in Latin above the level of Latin 100 and Classical Studies 197S. In addition, students will be required to pass an examination testing proficiency in Latin composition or to complete Latin 117.

Related Work. Latin majors normally take at least four courses in Greek and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

Classical Studies (Ancient History or Archaeology)

Prerequisites. Classical Studies 11 and 12; or 53 and 54; or 57S and 58S.

Major Requirements. Eight courses at the 100 level or above, including Classical Studies 197S and at least one other seminar or course of independent study. Reading knowledge of Latin or Greek to the level of Latin 64 or Greek 64. Two courses in the ancient languages above that level may be counted toward the major.

Honors

The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

Comparative Area Studies

Assistant Professor Gereffi, *Director*

The undergraduate major in comparative area studies offers a Bachelor of Arts degree to students interested in the interdisciplinary study of societies and cultures of a particular region of the world. In addition, students may elect to complement the

study with a concentration in another world area or in the comparative study of international problems. Students in the program are currently studying Latin America, Africa, the Middle East, Russia, South Asia, East Asia, Western Europe, and Canada. Although the program provides any student with a solid liberal arts background, it is primarily designed for those with career objectives in academia, government (especially the foreign service), international business, international law, health and environmental programs, the United Nations and international agencies, and private international religious or service organizations.

The program encourages the study of language, literature, religion, and art of the chosen area as well as analysis of its social, historical, and political roots and problems. Normally a student will concentrate in either the humanities or the social sciences. Many comparative area studies majors "double-major" in comparative area studies and in such fields as anthropology, history, political science, Spanish, and French.

The major draws its offerings from courses taught by over eighty Duke professors in a dozen cooperating departments. Interdisciplinary and intercultural courses have been designed specifically for majors in the program to help place those societies chosen for specialization in a broad comparative perspective. These courses stress the interrelationship of developed and underdeveloped societies and probe the difficulties and advantages of comparative, interdisciplinary, and intercultural research.

In addition to its director, the program is administered by an advisory committee representing the various areas and cooperating departments.

Advising: Students must identify their primary area focus. Faculty members with expertise in each area are available to provide advice concerning selection of an area and coursework in the major. Students wishing to specialize in an area not indicated in the categories of courses that follow will be required to submit a proposed course of study to the advisory committee for approval. Selection of area is normally done by the end of the sophomore year. The program encourages close relationships between faculty and students working in similar areas.

Study Abroad or on Another Campus: The program encourages qualified and interested students to engage in sustained study abroad in their chosen area for a semester or for an academic year. Duke students are eligible for a variety of programs now operating in Africa, Asia, Canada, Europe, and Latin America. Students can also take advantage of special programs in the United States for intensive language training, legislative or foreign service study in Washington, and internship programs at the United Nations. Occasionally summer internships in a variety of structured programs, including international business, are available for qualified students.

The courses listed below may be taken for credit as introductory courses, comparative courses, international relations courses, and area courses. Others may be selected with the approval of the Director. Courses in basic language instruction are not included, but courses in advanced language and literature that can be used to meet the language requirement (not the area requirement) for the major are shown under the appropriate area headings. For a complete description consult the listing under the appropriate department.

INTRODUCTORY COURSES

Anthropology 94. Introduction to Cultural Anthropology. *Staff*

History 25. Introduction to World History: to 1700. *Staff*

History 26. Introduction to World History: since 1700. *Staff*

History 75, 76. The Third World and the West. *Bergquist, R. Davis, Dirlik, Ewald, Gordon, and Richards*

Interdisciplinary Course 109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. *Staff*

Music 136. Introduction to Non-Western Music. *Seebass*

Political Science 92. Comparative Politics. *Valenzuela*

Religion 57. Introduction to the Religions of Asia. *Bradley, Corless, Lawrence, Partin, and Robinson*

COMPARATIVE COURSES

Anthropology

- 115. Gender Roles: A Cross-Cultural Perspective. *Staff*
- 116. Language, Ethnicity, and New Nations. *Apte*
- 119. Language, Culture, and Society. *Apte or Weller*
- 129. The Black Experience in the Americas: Roots and Directions. *Trouillot*
- 130. Social and Cultural Change. *O'Barr or Smith*
- 134. Political Anthropology. *O'Barr, Smith, or Williams*
- 136. Cross-Cultural Studies of Socialization. *Quinn or Williams*
- 140. The Anthropology of Race. *Fox*
- 155. Anthropological Approaches to Religion. *Weller*
- 164. Peasantry and Peasant Movements. *Fox, Smith, Trouillot, or Weller*
- 168. Beginnings of Civilization. *Zagarell*
- 170. Economic Anthropology. *Quinn, Smith, or Trouillot*
- 204S. The Anthropology of Cities. *Fox or Smith*
- 215S. The Anthropology of Women: Theoretical Issues. *Domínguez, Quinn, Smith, or Trouillot*
- 228S. Slavery and Society. *Domínguez*
- 239. Culture and Ideology. *Trouillot, Weller, or Williams*

Comparative Literature

- 121. Themes in Modern Non-Western Literatures: Arabic and Japanese Fiction. *Cooke and Fowler*
- 135. The Novel of the Self: East and West. *Fowler*

Economics

- 219S. Economic Problems of Underdeveloped Areas. *Kelley or Naylor*
- 286S. Economic Policy Making in Developing Countries. *Gillis*

History

- 110. Labor Movements in the Americas. *Bergquist*
- 120. History of Socialism and Communism. *Lerner*
- 154. Comparative Study of Revolutions. *Cell*
- 167S. United States and Canadian Constitutional Issues. *Cahow*
- 168S. The Atlantic Slave Trade. *Gaspar*
- 239S. History of Socialism and Communism. *Lerner*
- 243-244. Marxism and History. *Dirlik*

Interdisciplinary Courses

- 125. Strategies of Comparative Analysis. *Gereffi*
- 150S. Comparative Area Studies Senior Seminar. *Staff*
- 180. Perspectives on Human Development. *Martin Lakin and Maddox*
- 234S. The Political Economy of Development: Theories of Change in the Third World. *Bergquist, Fox, Gereffi, Smith, Trouillot, and Valenzuela*

Political Science

- 107. Comparative Environmental Policies. *McKean*
- 163. Gender, Politics and Policy: The Third World Case. *O'Barr*
- 172. Political Economy of Global Natural Resources. *Johns*
- 173S. Political Economy of World Food Problems. *Johns*
- 175. Political Parties and Legislatures in Western Democracies. *Kornberg*
- 195. Comparative Political Behavior in the U.S. and Canada. *Kornberg*
- 235S. Comparative Development of Islam. *Braibanti*
- 242S. Comparative Law and Policy: Ethnic Group Relations. *Horowitz*
- 249. Comparative International Development and Technology Flow. *Braibanti*
- 262S. International Communism. *Hough*
- 277. Comparative Party Politics. *Kornberg or Lange*
- 284S. Public Policy Process in Developing Countries. *Ascher*
- 293. Federalism. *Leach*

Public Policy Studies

- 242S. Comparative Law and Policy: Ethnic Group Relations. *Horowitz*
- 284S. Public Policy Process in Developing Countries. *Ascher*
- 286S. Economic Policy Making in Developing Countries. *Gillis*

Religion

- 71A, 72A. Freshman-Sophomore Seminars: African and Asian Traditions. *Staff*
- 142. Comparative Mythology. *Partin*
- 143. Mysticism. *Bradley*
- 195A, 196A. Junior-Senior Seminars: African and Asian Traditions. *Staff*

195C, 196C. Junior-Senior Seminars: Analytic, Comparative, and Constructive Studies. *Staff*

Sociology

- 118. Sex Roles and Society. *O'Rand*
- 170. Mass Communication. *Smith*
- 171. Comparative Health Care Systems. *Maddox*
- 178. Colonialism, Neocolonialism, and Internal Colonialism. *Tiryakian*
- 179. Sociology of Nationalism. *Tiryakian*
- 180. Modern Revolutions. *Stark or Tiryakian*
- 181. Contemporary Socialist Societies. *Stark*
- 201S. Social Change. *Gereffi or Tiryakian*
- 203. Comparative Aspects of Societal Transformation. *Simpson or Smith*
- 241. Social Stratification. *Campbell, O'Rand, or Stark*
- 243. Population Dynamics and Social Change. *Myers*
- 298S. Transnational Corporations in the Third World Economy. *Gereffi*

INTERNATIONAL RELATIONS COURSES

Anthropology

- 133. The Effects of Colonialism and Neocolonialism on Native Peoples. *Fox or Smith*
- 170. Economic Anthropology. *Quinn, Smith, or Trouillot*

Economics

- 108. Economics of War. *Weintraub*
- 201S, 202S. Current Issues in Economics. *Davies*
- 265S. International Trade and Finance. *Brock, Kimbrough, or Tower*

History

- 128. The United States and Latin America. *Bergquist*
- 159S. The Palestine Problem and United States Public Policy. *Kuniholm*
- 215-216. The Diplomatic History of the United States. *C. Davis*
- 253S, 254S. European Diplomatic History, 1871-1945. *W. Scott*

Interdisciplinary Courses

- 120, 120A. Perspectives on Food and Hunger. *Johns*
- 234S. Political Economy of Development: Theories of Change in the Third World. *Bergquist, Fox, Gereffi, Smith, Trouillot, and Valenzuela*

Political Science

- 93, 93D. Elements of International Relations. *Staff*
- 106. International Security. *Staff*
- 113. International Political Economy. *Grieco*
- 114. United States Foreign Policy and Latin America. *Valenzuela*
- 120. International Conflict and Violence. *Eldridge*
- 121. International Organization. *Grieco*
- 122. Modern International Politics. *Eldridge*
- 147. International Environmental Politics and Policies. *McKean*
- 149. United States and East Asia. *McKean*
- 157. Foreign Policy of the United States. *Holsti*
- 167. International Law. *Pye*
- 172. Political Economy of Global Natural Resources. *Johns*
- 173S. Political Economy of World Food Problems. *Johns*
- 201S. Problems in International Security. *Staff*
- 213S. Theories of International Political Economy. *Grieco*
- 220S. Problems in International Politics. *Holsti or Hough*
- 226S. Theories of International Relations. *Grieco*
- 227. International Law. *Pye*
- 267S. Policy Making in International Organizations. *Ascher*

Public Policy Studies

- 175S. The Palestine Problem and United States Public Policy. *Kuniholm*
- 257. United States Policy in the Middle East. *Kuniholm*
- 267S. Policy Making in International Organizations. *Ascher*

Sociology

- 102. America in the Modern World System. *Gereffi*
- 178. Colonialism, Neocolonialism, and Internal Colonialism. *Tiryakian*
- 204. The Dynamics of Global Interdependence. *Gereffi or Tiryakian*

AREA COURSES: AFRICA

History

- 115, 116. History of Africa. *Ewald*
- 195S.23, 196S.23. Issues in the History of Tropical Africa. *Ewald*

Political Science

- 161S. Comparative Government and Politics: Africa. *Johns*
- 171S. Race, Class, and Colonialism in Southern Africa. *Johns*

Religion

- 265. Religions of the West Africa Diaspora. *Lincoln*

AREA COURSES: CANADA

English

- 186. Canadian Literature in English. *Armitage*

French

- 114. Language and Civilization of Quebec. (Taught in Montreal.) *Staff*
- 131S. French in the New World. *Hull*
- 132. Literature and History of Quebec. (Taught in Montreal.) *Staff*
- 169. The Contemporary Novel in French Canada. *Tetel*

History

- 183S. Canada from the French Settlement. *Cahow*

Interdisciplinary Courses

- 184. An Introduction to Canada and Canadian Issues. *Leach*
- 282S. Seminar on Canada. *Leach*

Sociology

- 20S Series. Seminar on Paris and Montreal, 1900 and 1968. *Tiryakian*
- 244. Human Ecology and Urban Systems. *Myers or Smith*

AREA COURSES: EAST ASIA

Anthropology

- 121. China: Tradition and Transformation. *Weller*
- 131. Socialism and Society in China. *Weller*
- 163. Foundations of Chinese Civilization. (Taught in China.) *R. Davis, Dirlik, Kunst, or Weller*
- 195S, 196S. Modern Chinese Society. *Staff*

Chinese

- 135, 136. Introduction to Modern Chinese Literature. *Kunst*
- 171. The Novel in Modern China. *Kunst*
- Additional Chinese courses are taught in Beijing and Nanjing as part of the Duke Study in China Program.

History

- 141. Imperial China. *R. Davis*
- 142. China in the Modern World. *Dirlik*
- 143. Traditional and Early Modern Japan. *Gordon*
- 144. History of Modern Japan. *Gordon*
- 163. Foundations of Chinese Civilization. (Taught in China.) *R. Davis, Dirlik, Kunst, or Weller*
- 195S.07, 196S.07. Socialism and Revolution in East Asia. *Dirlik*
- 195S.17, 196S.17. Processes of Development in Traditional and Modern Japan. *Gordon*
- 195S.30, 196S.30. Traditions in China and the West. *R. Davis*
- 260S. Economic History of Japan. *Staff*

Japanese

- 155, 156. Readings in Modern Japanese. *Fowler*

Political Science

- 111. Contemporary Japanese Politics. *McKean*
- 149. United States and East Asia. *McKean*
- 169. Politics in Revolutionary China. *McKean*
- 211S. Current Problems and Issues in Japanese Politics. *McKean*

Religion

- 141. Religions of China and Japan. *Corless*
- 149. Buddha and Buddhism. *Corless*

- 218. Religion in Japan. *Corless*
- 287. The Scriptures of Asia. *Bradley*
- 288. Buddhist Thought and Practice. *Corless*

AREA COURSES: LATIN AMERICA

Anthropology

- 127. Social Transformations in Central America. *Smith*
- 128. Caribbean Societies and Cultures. *Dominguez, Trouillot, or Williams*

History

- 128. The United States and Latin America. *Bergquist*
- 131. Mexico and the Caribbean from the Wars of Independence to the Present. *TePaske*
- 132. Major South American Nations, 1850 to the Present. *Bergquist*
- 173. History of Spain from Late Medieval Times to the Present. *TePaske*
- 174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
- 177. Modern Latin America. *Bergquist*
- 195S.22, 196S.22. Problems in Latin-American History. *Bergquist or TePaske*
- 231S, 232S. Problems in the History of Spain and the Spanish Empire. *Bergquist or TePaske*

Political Science

- 114. United States Foreign Policy and Latin America. *Valenzuela*
- 151. Introduction to Latin-American Politics. *Valenzuela*
- 253S. Comparative Government and the Study of Latin America. *Valenzuela*

Portuguese

- 181. Brazilian Portuguese. *Wheeler*
- 182. Contemporary Brazilian Theater. *Wheeler*

Spanish

- 105, 106. Introduction to Spanish-American Literature. 105: *Ross*; 106: *Fein*
- 107S. Spanish-American Short Fiction. *Fein*
- 108S. Spanish Traditional Poetry. *Garci-Gómez*
- 131. Topics of Hispanic Civilization. *Staff*
- 133S. Spanish-American Civilization. *Fein*
- 146. The Spanish-American Novel. *Fein*
- 166. Nineteenth-Century Prose Fiction. *Pérez*
- 171. Literature of Contemporary Spain. *Osuna*
- 210. History of the Spanish Language. *Garci-Gómez*
- 245, 246. Modern and Contemporary Spanish-American Literature. *Fein and Pérez*

AREA COURSES: MIDDLE EAST

Anthropology

- 126. Middle East: Wars, Revolutions, and Social Change. *Dominguez*
- 147, 148. Introduction to Islamic Civilization. *Lawrence and staff*
- 241. The Rise of Civilization in Mesopotamia and Iran. *Zagarell*

Arabic

- 171S. Modern Arabic Literature in Translation. *Cooke*
- 173S. Women in Arabic Literature. *Cooke*

History

- 101G, 102G. Introduction to Islamic Civilization. *Lawrence and staff*
- 159S. The Palestine Problem and United States Public Policy. *Kuniholm*

Interdisciplinary Courses

- 162, 163. Introduction to Islamic Civilization. *Lawrence and staff*

Political Science

- 177, 178. Contemporary Social and Political Development in the Islamic World. *Braibanti*
- 235S. Comparative Development of Islam. *Braibanti*

Public Policy Studies

- 175S. The Palestine Problem and United States Public Policy. *Kuniholm*
- 257. United States Policy in the Middle East. *Kuniholm*

Religion

- 51. Introduction to Judaic Civilization. *Bland or E. Meyers*
- 110. Archaeology and Art of the Biblical World. *C. Meyers or E. Meyers*

- 132D. Palestine in Late Antiquity. *E. Meyers*
- 133. The Foundations of Post-Biblical Judaism. *E. Meyers*
- 134. Jewish Mysticism. *Bland*
- 135. Jewish Religious Thought. *Bland*
- 136. Contemporary Jewish Thought. *Bland or E. Meyers*
- 147. Muhammad and the Qur'ân. *Partin*
- 152. Islamic Mysticism. *Lawrence*
- 162, 163. Introduction to Islamic Civilization. *Lawrence and staff*
- 243. Archaeology of Palestine in Biblical Times. *C. Meyers*
- 244. The Archaeology of Palestine in Hellenistic-Roman Times. *C. Meyers or E. Meyers*
- 283. Islam and Modernism. *Lawrence*
- 284. The Religion and History of Islam. *Partin*

AREA COURSES: RUSSIA AND EAST EUROPE

Economics

- 293. Soviet Economic History. *Trembl*
- 294S. Soviet Economic System. *Trembl*

History

- 120. History of Socialism and Communism. *Lerner*
- 161, 162. History of Modern Russia. *Miller*
- 195S.18, 196S.18. Problems in the History of Russia before 1917. *Lerner or Miller*
- 201S. Aspects of Change in Prerevolutionary Russia. *Miller*
- 202S. The Russian Revolution. *Miller*
- 239S. History of Socialism and Communism. *Lerner*
- 262. Problems in Soviet History. *Lerner*

Polish

- 174. The Poles: Literature and Society, 1940–1980. *Krynski*

Political Science

- 165. Government and Politics of the Soviet Union. *Hough*
- 166. Soviet Foreign Relations. *Hough*

Russian

- 100. Studies in Russian Culture. (Taught in Leningrad.) *Andrews*
- 124. Masters of Russian Short Fiction. *Staff*
- 161, 162. Introduction to the Russian Novel. *Krynski*
- 175. Tolstoy. *Staff*
- 176. Dostoevsky. *Staff*
- 177. Introduction to the World of Chekhov. *Krynski*
- 185S. Introduction to Slavic Linguistics. *Andrews*
- 186S. History of the Russian Language. *Pugh*
- 196. Readings in Modern Russian. *Staff*
- 201, 202. Russian Novel of the Nineteenth Century. *Krynski*
- 225. Tolstoy. *Staff*
- 232. Dostoevsky. *Staff*

AREA COURSES: SOUTH ASIA

Anthropology

- 101, 102. Introduction to the Civilizations of Southern Asia. *Lawrence and staff*
- 120. South Asia: Institutions and Change. *Apte or Fox*

History

- 164. India, Pakistan, and Bangladesh: 1750 to the Present. *Richards*
- 193, 194. Introduction to the Civilizations of Southern Asia. *Lawrence and staff*
- 195S.21, 196S.21. Problems in Indian History. *Richards*
- 247. History of Modern India and Pakistan, 1707–1857. *Richards*
- 248. History of Modern India and Pakistan, 1857 to the Present. *Richards*

Interdisciplinary Courses

- 101, 102. Introduction to the Civilizations of Southern Asia. *Lawrence and staff*
- 162, 163. Introduction to Islamic Civilization. *Lawrence and staff*

Music

- 137. Music in South Asia. *Seebass and Silver*

Political Science

- 177, 178. Contemporary Social and Political Development in the Islamic World. *Braibanti*

Religion

140. Religions of India. *Bradley or Lawrence*
145. Social Issues in Contemporary Hinduism. *Robinson*
149. Buddha and Buddhism. *Corless*
160, 161. Introduction to the Civilizations of Southern Asia. *Lawrence and staff*
217. Islam in India. *Lawrence*
284. The Religion and History of Islam. *Partin*
287. The Scriptures of Asia. *Bradley*
288. Buddhist Thought and Practice. *Corless*

AREA COURSES: WESTERN EUROPE

Students may not undertake more than two courses devoted to a single European country.

Anthropology

123. Societies of Mediterranean Europe. *Friedl*

Art

161. Nineteenth-Century European Art. *Staff*
174. The History of Impressionism. *Staff*

Comparative Literature

170. The Modern: Problems of Definition, History, and Language. *Rolleston*

Distinguished Professor Courses

- 196S. Current Political Problems in Western European and Commonwealth Countries. *Cole*

Economics

150. History of Economic Thought. *Goodwin or de Marchi*

French

- 107S. Contemporary Ideas. *Staff*
136S. Life in Eighteenth-Century France. *Stewart*
139. French Civilization. *Tetel*
166, 167. Contemporary French Life and Thought. *Cordle*
256. Modern Literature and History. *Orr*

Germanic Language and Literature

- 127S. Contemporary Germany. *Bessent*
129. Deutsche Kulturgeschichte. *Staff*
130. German Life and Thought. *Borchardt*
175. Consciousness and Modern Society. *Rolleston*

History

- 105, 106. Political and Constitutional History of England. *Herrup*
117. Early Modern Europe. *Neuschel or Barnet-Robisheaux*
135. Political, Economic, and Social History of Europe, 1890–1939. *Colton*
136. Europe since 1939. *Colton*
171. A History of Women in Europe. *Neuschel*
174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
195S, 196S. Selected Seminars in European History. *Staff*
217S, 218S. Western Europe in the Twentieth Century. *Colton*
229S, 230S. Revolution in Modern Europe, 1789–1919. *Reddy*
231S, 232S. Problems in the History of Spain and the Spanish Empire. *TePaske*
253S, 254S. European Diplomatic History, 1871–1945. *W. Scott*
269S, 270S. British History, Seventeenth Century to the Present. *Cell*

Music

125. Masterworks of Music. *Staff*
156S. Music History II: Late Renaissance, Baroque. *Bartlet or Seebass*
157S. Music History III: Rococo and Classic. *Bryan or Seebass*
158S. Music History IV: Romanticism to the Early Modern Period. *Todd*

Political Science

115. Politics and Society in West Germany. *Kitschelt*
135. Political Development of Western Europe. *Lange*
136. Comparative Government and Politics: Western Europe. *Kitschelt or Lange*

225. Topics in Comparative Government and Politics: Western Europe. *Kitschelt or Lange*

232. Political Economy: Theory and Applications to Western Europe. *Lange*

Spanish and Portuguese

See appropriate listings under Latin America.

THE MAJOR

Introductory Courses: A student must take an introductory course emphasizing comparative approaches from each of two departments (two courses). See the listing under Introductory Courses.

Languages and Literature: Four semester courses in a language of the area are required. A year of literature in translation or general linguistics may be substituted for the second year of a language when (1) a student, by advanced placement or otherwise, demonstrates a language proficiency equivalent to that normally achieved in two years of formal language education at Duke; or (2) a second year of a language is unavailable. The specific language courses are too numerous to list here. Area advisers should be consulted for specific approval of the language choice unless it conforms to the list below.

Africa: Swahili (first year at Duke, second year at UNC); relevant European languages such as French may be used if appropriate to specific programs.

East Asia: Chinese, Japanese.

South Asia: Hindi-Urdu.

Middle East: Arabic, Persian; or modern Hebrew for persons specializing in Israel.

Latin America: Spanish; Portuguese for those specializing in Brazil.

Russia and Eastern Europe: Russian.

Western Europe: French, German, Italian, Portuguese, Spanish.

Canada: French.

Area Courses: Four semester courses in the geographical area of special interest (the area of the language studied). The areas and courses are listed above. Others may be selected with the consent of the Director.

Concentration: A student must undertake three courses in one of the following concentrations: (a) comparative courses, examples of which are listed above; or (b) a second geographical area. Students who specialize in Western Europe or Russia must select a second concentration from a non-European area.

Seminar: Each student must take the comparative area studies senior seminar. This course allows the student to write a high-quality research paper, normally in a single semester, that reflects the cross-cultural and interdisciplinary objectives of the major. Each student will work with an adviser affiliated with the major who is an expert on the topic chosen for the paper. Some students may want to couple the paper with an independent study project done prior to or concurrently with the seminar. Any paper written for the course can be a candidate for honors in the major.

In addition to the major requirements, students are encouraged, but not required, to: (1) take Interdisciplinary Course 109 (Contemporary International Problems) during their freshman or sophomore years; (2) enroll in the comparative methods course (Interdisciplinary Course 125) in their junior or senior year; (3) undertake at least one course from the courses in international relations listed above; (4) take at least one course reflecting a socialist state approach to contemporary problems, from among the courses listed above under Russia, or from courses with such a perspective in one of the developing world areas; (5) develop a proficiency in more than one foreign language.

Inquiries should be addressed to the Director, Comparative Area Studies, 2122 Campus Drive.

Comparative Literature (CL)

Associate Professor Rolleston (Germanic languages), *Chairman of the Committee on Comparative Literature*; Professors Anderson (English), Ryals (English), Stewart (Romance languages), Tetel (Romance languages), and Wardropper (Romance languages); Associate Professors Burian (classical studies), DeNeef (English), Orr (Romance languages), Pérez (Romance languages), and Thomas (Romance languages); Assistant Professors Fowler (international studies), Gaines (English), Torgovnick (English) and Westphal-Wihl (Germanic languages)

The program consists of courses linking works from several national literatures through concepts of genre, period, and style; or studying literature through related intellectual structures, e.g. film, philosophy, psychoanalysis. Students contemplating a major in comparative literature should have a reading knowledge of a foreign language and a broad acquaintance with British and American authors. Students taking the major are expected to acquire a reading knowledge of a second foreign language and to familiarize themselves with methods of studying literature in a comparative manner. The program, largely interdisciplinary, is directed by a committee, and the selection of courses for the major requires the approval of the committee. Inquiries concerning eligibility and requirements should be directed to Professor Rolleston, 07 Old Chemistry Building.

100. Introduction to Comparative Literature. Basic structures of literature understood as fiction-making: the journey, the hero, the storyteller, the goal of community. Texts from the *Odyssey* to contemporary works, with an introduction to theoretical issues. One course. *Rolleston*

121. Themes in Modern Non-Western Literatures: Arabic and Japanese Fiction. C-L: Comparative Area Studies. One course. *Cooke and Fowler*

122. The American Imagination. A syncretic approach to the literature of the Americas, North and South, drawing attention to the underlying homogeneity of New World culture. Borges, Faulkner, Garcia Marquez, Melville, Neruda, Thoreau, and others. One course. *Pérez*

123. Approaches to Arthurian Romance. Celtic and Latin background to the epic of chivalry; structure of the romance, and its transformations in France, Germany, and England during the High Middle Ages; roles of the medieval poet. One course. *Westphal-Wihl*

124. Continental Humanism. Readings from Boccaccio, Petrarch, Rabelais, Montaigne, Rojas, Cervantes, and Erasmus. One course. *Tetel*

125. The Romantic Impulse in the Novel. An exploration of how novels intermix realistic and romantic techniques, forms, themes, and concerns. Fictions by Emily Brontë, Stendhal, Flaubert, Dickens, Dostoevsky, Gide, Nabokov, Barth, and others. One course. *Torgovnick*

126. Toward the Dream Play. Scandinavian progenitors of modern drama. Readings from Kierkegaard, Ibsen (from *Brand* to *When We Dead Awaken*), and Strindberg (pre-Inferno period, *The Dream Play*, chamber plays). One course. *Anderson*

131. A New Realism. The literary-philosophical movement (1830-1900) usually designated as realism arising subsequent to the failure of the romantic vision. One course. *Ryals*

132. Dada and Surrealism. The international dada and surrealist movement in its multiple manifestations: theater, painting, novel, film, autobiography, and manifesto. Knowledge of French or German desirable. One course. *Thomas*

135. The Novel of the Self: East and West. Versions of the modern self in a parallel study of Eastern (primarily Japanese) and Western (English, French, German, Russian) novels. C-L: Comparative Area Studies. One course. *Fowler*

145. The Descent of the Epic. Epic impulses and persistent themes in literary history: Homer, Vergil, Dante, Voltaire, Dostoevsky, T. S. Eliot, and Joyce. One course. *Torgovnick*

159. Tragedy and the Tragic. Sources, social role, and philosophical implications of tragedy from ancient Greece to Shakespeare and the Elizabethans, the classical French theater and modern times. One course. *Burian*

160. An Approach to Comedy. Nature, purpose, and effect of comedy in the theater. Readings from the classics (Aristophanes, Plautus, Terence), the Renaissance (Machiavelli, Shakespeare, Molière, Lope de Vega), the Restoration, and the twentieth century. One course. *Wardropper*

169. The "Classical" Era in European Literature. The ancients versus the moderns; the common ideals underlying the founding of modern national literary traditions between the Renaissance and the French Revolution: Jonson, Racine, Molière, Rousseau, Lessing, Schiller, Jane Austen, and others. One course. *Stewart*

170. The Modern: Problems of Definition, History, and Language. Texts from about 1840 to the present studied with a view to defining "the modern" against the background of the romantic denial of transcendence and the turn to history, society, nature, and the self as sources of meaning. Baudelaire, Nietzsche, Dostoevsky, Proust, Kafka, Virginia Woolf, Borges. Other poetry and short fiction. C-L: Comparative Area Studies. One course. *Rolleston*

177. Film Theory. Recent critical developments in Marxist aesthetics, structuralism, semiotics of the image, feminist film theory. Both experimental and Hollywood narrative films. C-L: Film. One course. *Gaines*

185. Psychoanalysis, Literature, and Film. Texts by Kafka, Woolf, and Joyce; films by Bergman, Fellini, and others. C-L: Film. One course. *Gaines*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year by consent of instructor. Two courses. *Staff*

193, 194. Independent Study. Directed readings and research. Open only to qualified students in the senior year by consent of instructor. Two courses. *Staff*

COURSES CURRENTLY UNSCHEDULED

120. Theater of the Absurd

139. Perspectives on Contemporary Fiction

150. Introduction to Literary Criticism

180. Romanticism

THE MAJOR

Prerequisites. A reading knowledge of at least one foreign language; a basic survey course in English literature.

Major Requirements. (1) Comparative Literature 100; (2) two courses from those listed under Comparative Literature, or courses of literature in translation that cross national lines and invite comparative interpretation, or courses of literature written in languages that are seldom taught; (3) three courses in a single foreign literature at

the 100 level or above, to be read in the original language; (4) acquisition of a second foreign language through at least the intermediate level.

This last requirement may be fulfilled by examination or by completion of such courses as the following: Greek 63, 64 or 181S, 182S; Latin 181S, 182S; German 63, 101, or 181, 182; French 63, 74, or 181, 182; Italian 63 or 181, 182; Russian 63, 64; Hindi-Urdu 63, 64; Japanese 63, 64.

The Committee on Comparative Literature helps students in creating a program which gives both definition and scope to their literature courses in relation to their work in other disciplines.

Computer Science (CPS)

Professor Rose, *Chairman*; Associate Professor Ramm, *Director of Undergraduate Studies*; Professors Gallie, Loveland, Marinos, Patrick, A. Rosenberg, Starmer, Trivedi, Utku, and Woodbury; Associate Professors Ballard, Biermann, Kedem, Kootsey, Loendorf, and Wagner; Assistant Professors Douglas, Dugan, and C. Smith; Adjunct Professor Skarulis; Adjunct Associate Professor Coughran; Adjunct Assistant Professors Lustig, Pitt, J. Rosenberg, Rusnak, and W. Smith

The Department of Computer Science provides courses on the concepts of computing and computers, their capabilities, and uses. In most courses students make extensive use of the available computing facilities as problem-solving instruments. Students who wish to take a single introductory course, as part of their general education, usually elect Computer Science 51.

In cooperation with the Microelectronics Center of North Carolina (MCNC), the University of North Carolina at Chapel Hill, and other MCNC-affiliated universities in North Carolina, the department often sponsors advanced computer science and other high technology courses originating at other universities. These are available through a closed circuit television and data network belonging to MCNC. Contact the Department of Computer Science for further information on the availability of such courses.

51. Introduction to Computing. A course in computing assuming no previous experience. Problem solving using a digital computer. Use of a high level algorithmic programming language. The student will be expected to write a substantial number of programs. Includes use of computer in laboratory-style classes utilizing personal computers. One course. *Kootsey and staff*

51X. Introduction to Computing. Essentially like Computer Science 51 but covering a broader range of topics in greater depth. For students with previous programming experience. One course. *Staff*

152. Data Structures. Linear lists such as stacks, queues, dequeues, circular lists, and doubly linked lists; trees; multilinked structures and their use in algorithms. Prerequisite: Computer Science 51 or equivalent. One course. *Biermann and staff*

154. Computers and Programming. Computer structure, machine language, instruction execution, addressing techniques, and digital representation of data. Computer systems organization, logic design, microprogramming, and interpreters. Symbolic coding and assembly systems; macrodefinition. Prerequisite: Computer Science 152 or consent of instructor. One course. *Ramm and staff*

155. Program Design and Construction. Substantial programs. Design specifications, choice of data structures, estimation of programming effort, stepwise development, and program-testing methodology. Programming teams and human factors in system implementation. Advanced topics in use of a procedural language and file management. Prerequisite: Computer Science 154. One course. *C. Smith and staff*

157. Introduction to Switching and Automata Theory. C-L: Electrical Engineering 157. One course. *Carroll or Strole*

174. Analysis of Algorithms. Design and analysis of efficient algorithms for sorting, searching, dynamic structure manipulation, path-finding, fast multiplication, and others; nondeterministic algorithms and computationally hard problems. Prerequisites: Computer Science 152 and four semesters of college mathematics. One course. *Loveland or A. Rosenberg*

191, 192. Independent Study. Directed reading and research for qualified juniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

For Seniors and Graduates

200. Programming Methodology. Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies, choice and effective use of programming languages and systems, psychology of computer programming, proof of correctness of programs, analysis of algorithms, and properties of program schemata. Prerequisite: Computer Science 152. One course. *Wagner*

201. Programming Languages. Information binding, data structures and storage, control structures, recursion, execution environments, input/output; syntax and semantics of languages; study of PL/I, Fortran, Algol, APL, LISP, SNOBOL, and SIMULA; exercises in programming. Prerequisite: Computer Science 200. One course. *Ballard or C. Smith*

202. Applied Discrete Structures. Aspects of discrete mathematics that are essential to the development of computer science. Topics from combinatorics and graph theory, discrete probability theory, and mathematical logic. Prerequisites: Mathematics 103 and 104 or equivalents. One course. *Staff*

204. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. Addressing structures and error recovery. Multivendor software compatibility. Economic trade-offs. International standards. Prerequisites: Computer Science 154 and Electrical Engineering 157. C-L: Electrical Engineering 204. One course. *Pitt*

207. Fault-Tolerant Computer Systems. C-L: Electrical Engineering 207. One course. *Marinos*

208. Digital Computer Design. Prerequisite: Computer Science 157 or consent of instructor. C-L: Electrical Engineering 208. One course. *Marinos*

209. Microprocessor Fundamentals and Applications. Prerequisite: Computer Science 157 and consent of instructor. C-L: Electrical Engineering 209. One course. *Marinos*

210. VLSI Systems: an Introduction. A first course in VLSI using the Mead-Conway approach. Topics include (1) the basic components of MOS technology: the transistor and gates constructed therefrom; (2) techniques for composing components into useful logic blocks: array logic, passive logic networks, sequential machines; (3) introduction to techniques for composing logic blocks into systems; and (4) intro-

duction to software systems that aid the design process. Students will complete the design of a small system in NMOS. Prerequisite: Computer Science 157 or equivalent. Taught at the University of North Carolina-Chapel Hill as Comp 268. One course. Staff

215. Artificial Intelligence. Heuristic versus algorithmic methods; programming of games such as chess; theorem proving and its relation to correctness of programs; readings in simulation of cognitive processes, problem solving, semantic memory, analogy, adaptive learning. Prerequisite: Computer Science 152 or consent of instructor. One course. *Biermann or Ballard*

221. Numerical Analysis I. Error analysis, interpolation and spline approximation, numerical differentiation and integration, solutions of linear systems, nonlinear equations, and ordinary differential equations. Prerequisites: knowledge of an algorithmic programming language and intermediate calculus. C-L: Mathematics 221. One course. *Douglas, Gallie, or Patrick*

222. Numerical Analysis II. Calculation of eigenvalues and eigenvectors; numerical methods for solving partial differential equations and integral equations. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 222. One course. *Douglas, Rose, or Utku*

224. Analysis of Algorithms. Design and analysis of efficient algorithms. Design techniques include recursion, divide-and-conquer, and dynamic programming. Applications include sorting, searching, dynamic structures, pathfinding, fast multiplication, fast Fourier transform. Nondeterministic algorithms. Computationally hard problems. NP-completeness. This course is the same as Computer Science 174 with more advanced-level work required of the student. Prerequisites: Computer Science 152 and four semesters of college mathematics. One course. *Loveland or A. Rosenberg*

225. Formal Languages and Theory of Computation. An introduction to the study of abstract machines and the languages they define, their capabilities, and limitations. Finite-state automata, regular languages, pushdown automata, context-free languages, Turing machines, recursive functions and recursively enumerable sets, noncomputable sets, measures of complexity for algorithms. Prerequisites: four courses in college mathematics. One course. *Loveland or A. Rosenberg*

226. Mathematical Methods for Systems Analysis I. Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics, queuing theory, and simulation. Prerequisites: four courses in college mathematics. One course. *Trivedi*

227. Mathematical Methods for Systems Analysis II. Basic concepts and techniques used in the deterministic modeling of systems. Elements of linear algebra; linear, integer, dynamic, and geometric programming; and unconstrained and constrained optimization. Prerequisites: four courses in college mathematics. One course. *Trivedi*

231. Introduction to Operating Systems. Basic concepts and principles of multiprogrammed operating systems. Memory, CPU, I/O device management and scheduling. Buffering techniques. Performance evaluation. Case studies of existing systems. Prerequisite: Computer Science 154. One course. *Kedem, C. Smith, or Trivedi*

232. Compiler Construction. Models and techniques used in the design and implementation of assemblers, interpreters, and compilers. Lexical analysis, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation and optimization techniques. One course. *Wagner*

241. Data Base Methodology. Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Prerequisites: Computer Science 154 and either 155 or equivalent. C-L: Mechanical Engineering and Materials Science 242. One course. *Starmer or Loendorf*

252. Computer Systems Organization. Hardware and software aspects. Processor, memory, device, and communication subsystems; case studies of hardware system organization, e.g., parallel, associative, fault-tolerant; organization of software systems to exploit hardware systems organization; economic and reliability aspects of various hardware organizations. Prerequisites: Computer Science 154 and 157. C-L: Electrical Engineering 252. One course. *Loendorf or Trivedi*

265. Advanced Topics in Computer Science. One course. *Staff*

THE MAJOR

For the B.S. Degree

Prerequisites. Computer Science 51; Mathematics 33 (or 31), 34 (or 32), 105 (or 103), 106 (or 104).

Major Requirements. Computer Science 152; 154; three of the following: 155, 157, 174, 201, 215, 221, 231, 232, 241, 252; and Mathematics 117 or 135. If Mathematics 135 is elected, it is strongly recommended that it be followed by Mathematics 136. Students must take enough additional courses so that they have completed at least five courses (excluding Mathematics 103, 104, 105, 106) at the 100 level or above in one department other than computer science or in an approved area. A list of areas which have been approved by the department, such as the zoology-chemistry combination often chosen by premedical students, may be obtained from the Director of Undergraduate Studies.

Students planning to do graduate work should try to include Computer Science 221 and modern algebra in their course of study. Students interested in microelectronics design should take courses in physics and chemistry.

Honors. Students who are qualified (see the section on honors in this bulletin) may undertake work leading to a degree with distinction in computer science by applying to the Director of Undergraduate Studies. Normally, candidates must have grades of A in computer science courses. They must complete a substantial project, suitably documented, or a distinguished paper on which they will be examined orally by a committee of three faculty members.

Dance

For courses in dance, see Institute of the Arts.

Distinguished Professor Courses (DPC)

Distinguished Professor Courses enable students, regardless of their majors, to study with some of the most outstanding teachers and scholars within the University. The courses ordinarily focus on topics of broad intellectual and academic interest beyond the scope of a single discipline. They may count toward the distributional requirements, and if so, the division of each is indicated at the end of the description or by the division of a cross-listed course.

196S. Current Political Problems in Western European and Commonwealth Countries. Prerequisite: consent of instructor. Social sciences. C-L: Comparative Area Studies. One course. *Cole*

198. Geologic Perspective on Development of a Barrier Island Coast. Taught on the coast of North Carolina during spring break. Natural Sciences. Half course. *Pilkey*

200S. Current Problems in Classical Archaeology. Major problems of especially pressing concern: the antiquities market, tomb robbery, and forgeries. The origin of megaron house plans; emergence of the Etruscans as a nation; impetus behind the orientalizing taste that arose in the seventh century B.C. Juniors and seniors only. Humanities. One course. *Richardson*

201. Dante's *Inferno*. A close study of the text in a bilingual edition. Attention to the historical, political, and theological aspects of the poem. Examples of use of some of the cantos by Joyce, Eliot, and Beckett. Humanities. One course. *Fowlie*

203. Proust, *Remembrance of Things Past*. In the new three-volume translation by Kilmartin. The aesthetics of the novel in terms of its structure, characters, and social classes of France. Students who know French will be encouraged to do some of the reading in French. Humanities. One course. *Fowlie*

205. The French Symbolists and T. S. Eliot. A study of the poems and theory of Baudelaire, Mallarmé, and Rimbaud. The debt of the symbolists to Poe and their influence on Eliot. Taught in English. Bilingual texts will be used. Humanities. One course. *Fowlie*

207S. Topics in Psychobiology. The biological substrates of human behavior in health and disease. Drug abuse, alcoholism, depression, schizophrenia, and human aggression. Films and videotapes. Student presentations; patient interviews. Prerequisite: senior standing and consent of instructor. Natural Sciences or Social Sciences. One course. *Brodie*

COURSES CURRENTLY UNSCHEDULED

197S. Science, Technology, and the Future

Drama

For courses in drama, see Institute of the Arts.

Economics (ECO)

Professor Weintraub, *Chairman*; Associate Professor de Marchi, *Director of Undergraduate Studies*; Professors Clotfelter, Cook, Davies, Geweke, Gillis, Goodwin, Grabowski, Graham, Havrilesky, Kelley, Kreps, Naylor, Tower, Tremblé, Vernon, Wallace, and Yohe; Associate Professors McElroy and Tauchen; Assistant Professors Brock, C. Conrad, R. Conrad, Kimbrough, Luger, Marshall, Nickerson, Shetty, Stahl, and Zarkin; Adjunct Professor Gallant; Research Professor Coats

Economics courses develop the critical and analytical skills essential for understanding economic problems and institutions, in both their contemporary and historical settings. Although no particular vocational or professional goal is emphasized, these courses provide the academic background necessary for positions in industry, for work in many branches of government service, for law school, and for graduate study in business administration, economics, and the social sciences.

Students planning to do graduate work in economics are advised to take as many of the following courses in mathematics (listed in preferential order) as their schedules permit: Mathematics 31, 32, 103, 104, 131, 135, and 136.

1. National Income and Public Policy. Basic economic analysis emphasizing current public policy issues. Means of determining the level and rate of growth of aggregate national income and output. Causes of unemployment, inflation, and international

payment problems. The effects of monetary policy (money supply and interest rates) and fiscal policy (government expenditures and taxes) on these problems. (Open only to freshmen.) One course. *Staff*

2. Competition, Monopoly, and Welfare. The composition of output and the distribution of income in a market economy. Role of government. Contemporary problems of the environment. Topics such as environmental economics, monopoly, unionism, international trade. Comparison of a market economy with other systems of economic organization. Economic problems of developing countries. (Open only to freshmen.) One course. *Staff*

1D, 2D. The same courses as Economics 1, 2 except taught as lectures with discussion sections. Two courses. *Staff*

51. National Income and Public Policy. See Economics 1. (Open to all students.) One course. *Staff*

52. Competition, Monopoly, and Welfare. See Economics 2. (Open to all students.) One course. *Staff*

51D, 52D. The same courses as Economics 51, 52 except taught as lectures with discussion sections. Two courses. *Staff*

52X. Competition, Monopoly, and Welfare. Similar to Economics 52, but more rigorous. Prerequisites: Mathematics 31 and 32. One course. *Staff*

53. Economics of Contemporary Issues. Modern economic problems, such as environmental deterioration and urban decay. The market as one of the interrelated subsystems of the social system, from institutionalist, Marxist, and other perspectives in the social sciences. One course. *Havrilesky*

108. Economics of War. Conflict theory, causes and economic consequences of war, military personnel, military-industrial complex, disarmament, and the economy. Prerequisite: Economics 52. C-L: Comparative Area Studies. One course. *Weintraub*

133. The Evolution of the American Economy. The process of industrialization and modernization in the United States from the pre-Civil War period to the present. Prerequisites: Economics 51 and 52. One course. *Coats*

138. Economic Statistics. Survey of principal concepts and methods of application to economics. (Not open to students who have had Mathematics 53 or 117 or Psychology 117.) One course. *Marshall, McElroy, Tauchen, Vernon, Wallace, or Zarkin*

138X. Economic Statistics. Similar coverage to Economics 138, but more rigorous. Prerequisites: Mathematics 31 and 32. One course. *Staff*

139. Introduction to Econometrics. Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. Prerequisites: Economics 2 or 52 and Mathematics 32 or equivalent and Economics 138 or equivalent. One course. *McElroy, Marshall, Tauchen, or Wallace*

149. Microeconomic Theory. Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. Prerequisites: Economics 2 or 52 and Mathematics 31. (Not open to students who have had Public Policy Studies 110.) One course. *Graham, McElroy, Stahl, Trembl, Vernon, Wallace, or Zarkin*

149X. Microeconomic Theory. Similar coverage to Economics 149, but more rigorous. Prerequisites: Economics 2 or 52 and Mathematics 31 and 32. (Not open to students who have had Public Policy Studies 110). One course. *Staff*

150. History of Economic Thought. Approaches to economic problems from Aristotle to Keynes, emphasizing certain models and doctrines—their origins, rele-

vance, and evolution. Readings from Mun, Quesnay, Adam Smith, Malthus, Ricardo, Marx, Walras, Veblen, and Keynes. C-L: Comparative Area Studies. One course. *Goodwin or de Marchi*

153. Monetary Economics. The evolution and operations of commercial and central banking and nonbanking financial institutions in the United States, the determination of monetary aggregates and interest rates, the financial impacts of Treasury operations, and the linkages from Federal Reserve actions to price level, employment, economic growth, and balance of payments objectives. Prerequisite: Economics 154. One course. *Brock, Havrilesky, or Yohe*

154. Aggregate Economics. Concepts and measurement of national income and expenditures, employment, interest rates, and price levels; the theoretical determination of these aggregates; applications of macroeconomic theory to business cycles and economic growth. Prerequisites: Economics 1 or 51 and 2 or 52 and Mathematics 31. One course. *de Marchi, Havrilesky, Kimbrough, Nickerson, Stahl, Tauchen, Tower, or Yohe*

154X. Aggregate Economics. Similar to Economics 154, but more rigorous. Prerequisites: Economics 1 or 51, and 2 or 52, and Mathematics 31 and 32. One course. *Staff*

155. Labor Economics: Analysis and Measurement. Labor market equilibria. The demand for labor. The supply of labor: human fertility, human capital, hours of work, and labor force participation. Wage levels and differences. Union and government as labor market factors. Prerequisites: Economics 138 and 149 and Mathematics 31. One course. *Lewis or Zarkin*

159S. State and Local Public Policy. Does not count for economics major requirements. C-L: Public Policy Studies 159S. One Course. *Luger*

160. Resource Economics and Public Policy. Microeconomic analysis of nonrenewable resources. Resource scarcity and economic interpretations of doomsday models. Rationale for government intervention into natural resource markets and the effects of governmental policies on investments, rates of extraction, and conservation. Prerequisite: Economics 149. One course. *R. Conrad*

184. An Introduction to Canada and Canadian Issues. Does not count for economics major requirements. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, History 184, Political Science 184, and Sociology 184. One course. *Leach*

189. Business and Government. Public policies which most directly affect the operation of competition in the business world. The economic basis for an evaluation of antitrust policy, public utility regulation, and public enterprise. Prerequisites: Economics 138 and 149, or consent of instructor. One course. *Grabowski or Vernon*

191, 192. Independent Study. Directed reading and research. Prerequisites: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Same as Economics 191, 192, but for seniors. Two courses. *Staff*

For Advanced Undergraduates and Graduates

204S. Advanced Monetary Economics. Monetary theory and its statistical and institutional implementation. Particular attention to the development of aggregative theories of prices, interest rates, and production; the functioning of monetary policy within various theoretical frameworks; appraisal of recent use and limitations of Federal Reserve policy. Prerequisite: Economics 153. One course. *Havrilesky or Yohe*

205S. Advanced Monetary Theory and Policy. Emphasis on recent issues: innovations in the payments mechanism and new monetary aggregates, the subterranean economy, financial crises, alternative views of the monetary policy transmission mechanism, and the monetarist-fiscalist controversy. Prerequisite: Economics 153. One course. *Havrilesky or Yohe*

212S. Economic Science and Economic Policy. A historical examination of the impact of economics on public policy; topics vary each semester and have included energy and anti-inflation policy, productivity growth, the Third World, and the Council of Economic Advisers. One course. *Goodwin*

218. Macroeconomic Policy. Does not count for economics major requirements. C-L: Public Policy Studies 218. One course. *Luger*

219S. Economic Problems of Underdeveloped Areas. Analysis of underdeveloped countries with some attention to national and international programs designed to accelerate development. Prerequisite: Economics 149 or consent of instructor. C-L: Comparative Area Studies. One course. *Kelley or Naylor*

232. Analytical Methods IV: Topics in Economic Policy. Does not count for economics major requirements. C-L: Public Policy Studies 232. One course. *Gillis*

234. Urban and Regional Economics. Presents models to analyze metropolitan systems and the location of economic activity; to understand the causes of selected urban and regional problems, including unbalanced growth and development, poor housing conditions, residential segregation, deteriorating services, and fiscal crises; and to assess the impact of public policies toward states and substate areas. Prerequisite: Economics 149 or consent of instructor. One course. *Clotfelter or Luger*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. Prerequisites: Economics 149 and 237 or equivalents. One course. *Marshall or Wallace*

244. Corporate Economics I. Strategic planning models of the firm including marginal analysis, mathematical programming, portfolio, and corporate simulation models. Economics as the language of corporate planning and modeling. Prerequisites: Economics 138 and 149 or equivalents. One course. *Naylor*

245. Econometrics II. Advanced theory and applications: includes specification error, generalized least squares, lag structures, Bayesian decision making, simultaneous equation methods, and forecasting. Emphasis on current applied literature. Prerequisite: Economics 243. One course. *Geweke, McElroy, Tauchen, or Wallace*

246. Selected Topics in Econometric Theory. Analysis of panel data, combining data from different sources, vector autoregressive methods, problems of causation in time series data, nonlinear estimation, limited dependent variables, sample selection bias, and other topics to be chosen subject to the interests of the class. One course. *Geweke, Tauchen, or Wallace*

247S. Applied Econometrics. Application of current developments in econometric methodology to empirical problems in economics. Emphasis on the conduct of empirical research, including model and hypothesis formulation, testing, and integration of economic and econometric theory. One course. *Geweke, Marshall, McElroy, Tauchen, and Wallace*

250S. Modern Economic Thought. Major streams of economic analysis since 1936. Selected topics from the economics of Keynes, its offshoots and coordinate

developments in monetary and equilibrium theory; post-Marxian economic theory. Historical evolution of recent ideas and their interrelations. Prerequisites: Economics 138 and 149 and 154 or consent of the instructor. One course. *de Marchi or Weintraub*

265S. International Trade and Finance. Fundamental principles of international economic relations. The economic basis for international specialization and trade and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisites: Economics 149 and 154. C-L: Canadian Studies and Comparative Area Studies. One course. *Brock, Kimbrough, or Tower*

268. Federal Tax Policy. Does not count for economics major requirements. See C-L: Public Policy Studies 268; also C-L: Law 518. One course. *Clotfelter or Schmalbeck*

286S. Economic Policy Making in Developing Countries. Does not count for economics major requirements. See C-L: Public Policy Studies 286S; also C-L: Comparative Area Studies. One course. *Gillis*

287. Public Finance. Economic aspects of such problems as the growth of government, the proper role of the state, the centralization and decentralization of government, government bureaucracy, the impact of taxes and spending on the wealthy and the poor, as well as other public policies and questions. Prerequisite: Economics 149. One course. *Davies*

293. Soviet Economic History. Establishment of foundations of a socialist economy: collectivization, industrialization, and search for economic efficiency. C-L: Comparative Area Studies. One course. *Trembl*

294S. Soviet Economic System. Economic planning and administration in the Soviet Union and other socialist countries. International comparisons. Theoretical and applied problems of resource allocation, economic development, and optimal micro decision making in a nonmarket economy. C-L: Comparative Area Studies. One course. *Trembl*

Honors Seminars (by invitation only)

201S, 202S. Current Issues in Economics. Economic analysis of such issues as the health care system, crime and punishment, pollution and the environment, the performing arts, welfare, and the energy crisis. Prerequisites: For 201S: 138 and 149 and, for Economics 202S: Economics 201S. C-L: Comparative Area Studies. Two courses. *Davies*

203S. Mathematical Economics. Selected mathematical tools from symbolic logic, naive set theory, linear algebra, calculus, analysis, and elementary topology applied to the analysis of economic problems. Topics include consumer choice, production, general equilibrium, and growth. Prerequisites: two courses in college calculus and Economics 149. One course. *Graham*

206S. Regulation and Industrial Economics. Analysis of industrial competition and performance in industries such as automobiles, steel, agriculture, airlines, pharmaceuticals, computers, and cable TV. Analysis of the efficiency of regulation and other public policy programs. Prerequisites: Economics 138 and 149. One course. *Grabowski*

207S. Conflict and Cooperation in Economics. Elements of game theory. Cooperative and noncooperative games with reference to trading, general equilibrium theory, oligopoly, and monopoly. Prerequisites: Economics 149 and Mathematics 103. One course. *Weintraub*

208S. Economics of Labor Supply and the Family. Supply of labor and returns to human capital over the life cycle; demand for labor and discrimination; sex and race differences in wage rates, hours of work earnings, occupation, and unemployment; specialization, conflict and cooperation, and the allocation of goods and leisure within a family; marriage and divorce; and fertility. Prerequisites: Economics 138 and 149; Economics 139 is recommended. One course. *McElroy*

209S. Economics of Population. Relationship of population growth to economic development and to natural resource and environmental pressures. Causes and impacts of population change, including economic models of fertility, mortality, marriage, and migration. Prerequisites: Economics 149 and 154. One course. *Kelley*

210S. Law and Economics. The impact of law upon economic activity; e.g., the role of contract law in facilitating exchange or the role of product liability in determining the quality of goods produced. Prerequisites: Economics 138 and 149. One course. *Graham*

211S. Current Problems in Aggregate Supply. Selected topics in supply-side economics: the natural rate of unemployment, job search, implicit contracts, production and inventory cycles, the impact of tax policy on aggregate production, and the rate of inflation. Prerequisites: Economics 153 or 154 and Economics 138. One course. *Nickerson or Tauchen*

213S. Economics of Slavery in the American South. The nature, development, and economic and social consequences of slavery in the United States during the nineteenth century. Prerequisites: Economics 149 and consent of instructor. C-L: Afro-American Studies 213S. One course. *Coats*

COURSES CURRENTLY UNSCHEDULED

132. Introduction to Economic History

198S. Economics of Regulation

200. Capitalism and Socialism

233. Economics of State and Local Governments

235. The Economics of Crime

237. Statistical Methods

285. Evaluation of Public Expenditures

THE MAJOR

Prerequisites. Mathematics 31, Economics 1 or 51, and Economics 2 or 52.

Major Requirements. Economics 149, 154, and any three additional 100- or 200-level courses. Substitution of similar courses in other departments for courses in the economics department will not be permitted. Prerequisites for admission to an honors seminar are two of the following courses: Economics 138, 149, and 154.

Honors. For graduation with distinction at least one honors seminar and an honors paper are required. See the section on honors in this bulletin.

Education (EDU)

Associate Professor Davis, *Chairman and Director of Undergraduate Studies*; Professors Gehman and Page; Associate Professors Ballantyne, Carbone, Di Bona, Johnson, and Sawyer; Adjunct Professor Eilber; Adjunct Associate Professors Martin and Pittillo; Lecturers Fowler and Leach

Students who desire an understanding of the study of education as part of their liberal arts program should elect courses in accordance with their special interests. Selected courses in education may satisfy distribution requirements in the division of the social sciences. Students who expect to teach should confer with the Director of Undergraduate Studies or other advisers in the program prior to registration each semester. Students interested in certification to teach in secondary schools should consult with Professors Carbone or Davis.

100. Social and Philosophical Foundations of Education. Basic features and assumptions, viewpoints, and issues of education in contemporary America. One course. *Di Bona*

103. American Educational Theory. A study of contemporary issues and problems. One course. *Carbone*

117S. Psychology of Personal and Social Adjustment. Principles of mental health affecting individual and social adjustments. One course. *Staff*

118. Educational Psychology. Emotional and cognitive learning in children, youth, and adults. One course. *Ballantyne, Davis, or Page*

121. Infancy, Early Childhood, and Educational Programs. Developmental theories and their practical application in education. Emphasis on parenting and teaching. One course. *Staff*

140. The Psychology of Work. Factors affecting career choice and change. One course. *Ballantyne*

149S. Exceptional Children. Etiology and assessment of major types of exceptionalities, including intellectual abilities, physical or emotional handicaps, and sensorially impaired. Family relationships and treatment programs. One course. *Davis*

155. Tests and Measurements. Measurement of abilities, personality, and achievement. Tests and other instruments for evaluating individual and program performance. One course. *Page*

168S. Contemporary Education Criticism. One course. *Carbone or Di Bona*

170. The Undergraduate Curriculum. The structure, theory, and history of collegiate education in America and Europe. Stress will be placed on students, institutions, and policy, with participants expected to use their own education as a case study of curricula effectiveness. One course. *Staff*

171T, 172T. Junior-Senior Tutorials. Small group discussions of significant books, authors, and ideas in education. The availability of tutorials, their content, and the instructors will be announced before preregistration. Prerequisite: consent of instructor. Credit to be arranged. *Di Bona and staff*

189. The Teaching of Composition, Grammar, and Literature in Secondary School. C-L: English 118. One course. *Nygard or Butters*

191, 192. Independent Study. Directed reading and research for juniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

For Seniors and Graduates

211. Education and the Mass Media. Impact of mass media on behavior, particularly of children. One course. *Di Bona*

215S. Secondary Education: Principles. Principles, curriculum, and methods in secondary education. Prerequisite: C average overall and in teaching field or fields. Must be accompanied by Education 216. One course. *Carbone or staff*

216. Secondary Education: Internship. Supervised internship in junior and senior high schools. Full time for half a semester. Two courses. *Carbone or staff*

225. Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. One course. *Carbone or staff*

227. Contemporary Theories of Counseling and Psychotherapy. Prerequisites: two courses in psychology or educational psychology. One course. *Staff*

232. Psycho-educational Counseling with Families. Individual and group counseling concerning psycho-educational problems of families. Prerequisite: consent of instructor. One course. *Ballantyne or Davis*

236. Teaching Developmental and Remedial Reading in the Secondary School. Principles, methods, and materials for the development of effective reading attitudes and skills in developmental and remedial programs. One course. *Staff*

242. Group Counseling. Theories and techniques of counseling for small groups of children, adolescents, teachers, parents, and other adults. Prerequisite: consent of instructor. One course. *Ballantyne*

246. Teaching of Mathematics. Aims, curriculum, and classroom procedure for teaching secondary school mathematics. One course. *Staff*

276. The Teaching of High School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedures, field trips, and course and lesson planning for secondary school science. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

173, 174. Clinical Reading Practicum

205. Selected Topics

248. Practicum in Counseling

UNIVERSITY PROGRAM FOR PREPARATION FOR TEACHING*

Duke University offers programs to prepare students to meet certification requirements for teaching in secondary schools, although no major is offered in education. Prerequisites for all prospective teachers are Psychology 11 and Education 100 or 103. Special materials and methods courses should be taken in the education program and other appropriate departments prior to undergraduate student teaching, which is part of a planned professional semester in the senior year. Only students with a C average or higher overall and in the major and teaching fields will be admitted to student teaching.

Secondary School Teaching

Prospective secondary school teachers must major in a subject other than education. They are advised to consult the appropriate adviser in education prior to each

*Duke University is accredited by the National Council for Accreditation of Teacher Education for the preparation of secondary school teachers. The program is also approved by the North Carolina Department of Public Education.

registration period to assure that they will be eligible to enter the required student teaching program. Students preparing to teach in a secondary school must meet certification requirements by qualifying in one teaching field. Qualifications for certification to teach a single science may be sought under either the Bachelor of Arts or the Bachelor of Science degree.

English (ENG)

Professor G. Williams, *Chairman*; Professor Strandberg, *Director of Undergraduate Studies*; Associate Professor Gerber, *Supervisor of Freshman Instruction*; Professors Anderson, Budd, Cady, Duffey, Ferguson, Gleckner, Jackson, Lentricchia, Monsman, Nygard, Price, Randall, Ryals, Smith, and K. Williams; Associate Professors Applewhite, Butters, Clum, DeNeef, Jones, Mellown, and Pope; Assistant Professors Gaines, Porter, Sandler, and Torgovnick; Lecturer Wittig

WRITING AND LANGUAGE

For courses in composition see below and also University Writing Courses 4, 5, 6, and 7.

3. Introductory Composition and Literature. A skills course in composition and literature (contemporary essays and short stories), with frequent writing assignments; regular individual conferences. (This course, offered in the Summer Transitional Program, does not satisfy the requirement for proficiency in writing.) One course. *Staff*

12. Intermediate Composition. The grammar and mechanics of expository writing. Frequent writing assignments. Priority given to freshmen, then sophomores. One course. *Staff*

28S. Introduction to Creative Writing. Prerequisite: consent of instructor. One course. *Staff*

29. This number represents one course credit for advanced placement on the basis of the College Board examination in Composition and Language.

61S. Writing: Prose Fiction and Drama. Prerequisite: consent of instructor. One course. *Staff*

62S. Writing: Poetry. Prerequisite: consent of instructor. One course. *Staff*

101S. Advanced Expository Writing. Techniques of effective writing. One course. *Staff*

103S, 104S. Writing: Short Stories. Class discussion of students' manuscripts; individual conferences with the instructor. Open to sophomores, juniors, and seniors. Prerequisite: consent of instructor. Two courses. *Applewhite, Pope, Porter, or Price*

105S. Writing: Longer Prose Narrative. The writing of a novel or novella or a group of short stories. Primarily for juniors and seniors. Prerequisite: consent of instructor. One course. *Price*

106S. The Writing of Poetry. Meter, image, tone, and dramatic organization in traditional and modern poems as a basis for original composition. Prerequisite: consent of instructor. One course. *Applewhite or Pope*

107S. Writing: Drama. Scripts for the stage, screen, and television. Prerequisite: consent of instructor. C-L: Drama 112S and Film. One course. *Clum or Sandler*

109S. Special Topics in Writing. Advanced work for majors who have taken at least two previous 100-level writing courses. Prerequisite: consent of instructor. One course. *Staff*

111. Introduction to Linguistics. C-L: Anthropology 107, Interdisciplinary Course 111, and Linguistics. One course. *Staff*

112. English Historical Linguistics. Introduction to methods and principles of historical linguistics, as exemplified by the history of the English language from Proto-Indo-European to the present. C-L: Linguistics. One course. *Butters or Nygard*

115. Present-Day English. Origins, development, and current structure of English, especially in America. Transformational versus traditional and structural grammar, written versus spoken English, social and regional dialects. C-L: Linguistics. One course. *Butters or Nygard*

118. The Teaching of Composition, Grammar, and Literature in Secondary School. Description of present-day American English, varieties of grammatical analysis, usage, dialect; application of language study to composition. Analysis of the genres of literature and application of basic methods of critical study. Frequent assignments in writing. C-L: Education 189. One course. *Nygard or Butters*

119. Current Topics in Linguistics. C-L: Anthropology 112, Interdisciplinary Course 119, and Linguistics. One course. *Staff*

For Juniors, Seniors, and Graduates

208. History of the English Language. Introductory survey of the changes in sounds, forms, and vocabulary of the English language from its beginning to the present, with emphasis on the evolution of the language as a medium of literary expression. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Butters or Nygard*

209. Present-Day English. A survey of contemporary linguistic theories applied to modern English; designed for students of literature and teachers of English. C-L: Linguistics. One course. *Butters or Nygard*

See also Institute of the Arts in this bulletin.

INTRODUCTION TO LITERATURE

20. This number represents one course credit for advanced placement on the basis of the College Board examination in Literature and Composition.

21S. Studies in the Novel. One course.

22S. Studies in Drama. One course.

23S. Studies in the Short Story. One course.

24S. Studies in Poetry. One course.

25S. Studies in the Epic. One course.

26S. Studies in Special Topics. May be taken twice. One course.

49S. Special Freshman Seminar. Offered as a Freshman Innovative Seminar. One course. *Staff*

51, 52. Representative American Writers. Selections and complete works. 51: Poe, Emerson or Thoreau, Hawthorne, Melville, Whitman, Dickinson, and Twain; not open to students who have taken English 152 or 153. 52: James, Frost or Robinson, Crane or Dreiser, O'Neill, Faulkner, Hemingway, and others. Not open to students who have taken English 153 or 154. Two courses. *Staff*

91. Introduction to the Study of English Literature. Methods of literary analysis through the study of selected works of Chaucer, Shakespeare, Pope, and Wordsworth. Not open to students who have taken English 55 or 56. One course. *Staff*

93. Introduction to the Study of Literary Genre. An introduction, through selected poetry, fiction, and drama, to the distinctive nature of each major genre and to the critical procedures for examining that genre. One course. *Staff*

ENGLISH AND BRITISH LITERATURE

121. Medieval English Literature to 1500. The principal forms and examples of English prose, poetry, and drama of the Anglo-Saxon and Middle English periods (excluding Chaucer). In translation. C-L: Medieval and Renaissance Studies. One course. *Nygard*

122. Sixteenth-Century English Literature. Emphasis in poetry on Wyatt, Sidney, Spenser, Raleigh, Shakespeare; in prose on Sidney and Sir Thomas More; in drama on Marlowe. C-L: Medieval and Renaissance Studies. One course. *DeNeef*

123. English Literature: 1600 to 1660. Emphasis in poetry on Jonson and the cavaliers, Donne and the metaphysicals; in drama on Jonson, Tourneur, Webster, Ford; in prose on character writers, Bacon, Burton, Donne, Browne. C-L: Medieval and Renaissance Studies. One course. *DeNeef or Randall*

124. English Literature: 1660 to 1800. Major genres and authors such as Dryden, Congreve, Addison, Swift, Pope, Gray, Johnson, Blake, and Defoe or Fielding. One course. *Ferguson or Jackson*

125. English Literature of the Romantic Period. Wordsworth, Coleridge, Byron, Shelley, Keats. One course. *Applewhite or Gleckner*

126. English Literature: 1832 to 1900. Major writers and genres, with special emphasis on Carlyle, Tennyson, Browning, Arnold, the pre-Raphaelites, and Hopkins. Collateral reading from novels. One course. *Monsman or Ryals*

127, 128. Twentieth-Century British Literature. Emphasis on principal writers of fiction, drama, and poetry. 127: usually Conrad, Shaw, Yeats, Wells, Synge, Forster, Woolf, and Joyce. 128: usually Lawrence, Cary, Huxley, Auden, Greene, Beckett, and Dylan Thomas. Two courses. *Mellown, Pope, or Smith*

131. Studies in a Single British Author. One course. *Staff*

133. Modern British Drama. O'Casey, Coward, Eliot, Osborne, Pinter, Beckett, Stoppard, and others. C-L: Drama 148. One course. *Clum*

135. British Poetry of the Twentieth Century. Changes in poetry and its criticism from the Edwardians. Yeats, Housman, Lawrence, Owen, the Sitwells, Graves, Auden, MacNeice, Dylan Thomas, Hughes, and Larkin. One course. *Mellown, Pope, or Smith*

136. Eighteenth-Century British Novel. Defoe, Richardson, Fielding, Smollett, and Sterne; the Gothic novel. One course. *Ferguson or Jackson*

137. Nineteenth-Century British Novel. Scott, Austen, Dickens, Thackeray, Trollope, the Brontës, George Eliot, Meredith, Butler, Hardy, and others. One course. *Monsman or Ryals*

138. Twentieth-Century British Novel. Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. One course. *Mellown, Pope, or Smith*

139S. Special Topics in British Literature. One course. *Staff*

Major Authors

141. Chaucer. Focus on *The Canterbury Tales* and its literary and social background. C-L: Medieval and Renaissance Studies. One course. *DeNeef or Nygard*

143, 144. Shakespeare. 143: twelve plays before 1600. 144: usually ten plays after 1600. C-L: Drama 141, 142 and Medieval and Renaissance Studies. Two courses. *DeNeef, Jones, Porter, Randall, or G. Williams*

145. Milton. Poetry and its literary and social background. C-L: Medieval and Renaissance Studies. One course. *DeNeef or Price*

For Juniors, Seniors, and Graduates

212. Middle English Literature: 1100 to 1500. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Nygard*

221. Renaissance Prose and Poetry: 1500 to 1660. Selected topics. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Randall, or G. Williams*

225. Renaissance Drama: 1500 to 1642. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Randall or G. Williams*

235. Restoration and Eighteenth-Century Literature: 1660 to 1800. Selected topics. One course. *Ferguson or Jackson*

241. Romantic Literature: 1790 to 1830. Selected topics. One course. *Gleckner, Jackson, or Monsman*

245. Victorian Literature: 1830 to 1900. Selected topics. One course. *Monsman or Ryals*

251. British Literature since 1900. Selected topics. One course. *Mellown or Smith*

AMERICAN LITERATURE

151. American Literature to 1820. Colonial authors such as Bradford, Taylor, Cotton Mather, Edwards, Byrd, and Franklin, and authors of the early Republic such as Tyler, Freneau, and C. B. Brown. One course. *Jones*

152. American Literature: 1820 to 1860. Prose and poetry of American romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. (Not open to students who have taken English 51.) One course. *Staff*

153. American Literature: 1860 to 1915. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. (Not open to students who have taken English 52.) One course. *Staff*

154. American Literature: 1915 to 1960. Eliot, Fitzgerald, Hemingway, Faulkner, and others. (Not open to students who have taken English 52.) One course. *Staff*

155. Contemporary American Writers. Novelists and poets prominent since 1960. One course. *Duffey or Strandberg*

157, 158. American Literature and Culture. Relationship of literature to the other arts, American intellectual history, religion, and science and technology. 157: to the Civil War. 158: from the Civil War to 1960. Two courses. *Cady*

161. Studies in a Single American Author. One course. *Staff*

162. Twentieth-Century American Drama. Representative plays by O'Neill, Odets, Williams, Miller, Albee, Lanford Wilson, and others. C-L: Drama 146. One course. *Clum*

163. Twentieth-Century American Poetry. The classicism of Pound, Eliot, and the Fugitives in relation to the neoromanticism of Stevens, Williams, Crane, and Roethke. Developments during World War II and after: Lowell, Jarrell, Berryman, Dickey, Lev-
ertov, and Wright. One course. *Applewhite, Duffey, or Pope*

164, 165. American Fiction. A survey of the novel and the short story. 164: the nineteenth century; Poe, Hawthorne, Melville, Twain, James, and others. 165: the twentieth century; Hemingway, Faulkner, Fitzgerald, Barth, Pynchon, and others. Two courses. *Clum, Strandberg, or K. Williams*

167, 168. Afro-American Literature. 167: oral and written literary traditions from the American colonial period into the nineteenth century, including the spiritual as lyric poetry and the slave narrative as autobiography. 168: the late nineteenth and the twentieth centuries, Paul Laurence Dunbar to Cyrus Colter. C-L: Afro-American Studies 173, 174. Two courses. *K. Williams*

169S. Special Topics in American Literature. One course. *Staff*

For Juniors, Seniors, and Graduates

263. American Literature to 1865. Selected topics. One course. *Anderson or Jones*

267. American Literature: 1865 to 1915. Selected topics. One course. *Budd, Cady, or K. Williams*

275. American Literature since 1915. Selected topics. One course. *Duffey, Lentricchia, or Strandberg*

GENRE AND WORLD LITERATURE

170. Theory of Genre. Introduction to literary genre and the critical questions raised about literature when examined from a generic perspective. One course. *DeNeef or Jackson*

171. Studies in a Genre. One course. *Staff*

173. Legend and Literature. Classical, Celtic, and/or Germanic legends and their places in later literature. Special attention to monsters in literature and to Arthurian material. One course. *Torgovnick*

176. Introduction to Folklore. A survey of the materials of oral tradition (folktale, legend, myth, and related forms) and the methods of investigation in the field. One course. *Nygard*

177. Ballad and Folksong. Orally transmitted song traditions, British and American. One course. *Nygard*

178. Literature and the Other Arts. Selected topics in the study of the interrelation of literature and other art forms, such as music and painting. One course. *Staff*

179S. Special Topics in a Literary Genre. Half course (summer only) or one course. *Staff*

182. Western Drama, Classical to Neoclassical. Continental and British theater and drama from the fifth century B.C. to A.D. 1800: Aeschylus to Racine. C-L: Drama 143 and Medieval and Renaissance Studies. One course. *Clum or Sandler*

183. Western Drama from 1800 to 1914. Continental, British, and American drama. Wilde, Shaw, Ibsen, Chekhov, Strindberg, Herne, Moody, and others. C-L: Drama 144. One course. *Clum or Sandler*

184. Modern Continental Drama. Kaiser, Brecht, Sartre, Genet, Pirandello, Ionesco, and others. C-L: Drama 145. One course. *Sandler*

186. Canadian Literature in English. Eighteenth century to the present. Emphasis on the twentieth century and on novels by Hugh MacLennan, Margaret Laurence, Mordecai Richler, Margaret Atwood, Rudy Wiebe, and others. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

CRITICISM

For Juniors, Seniors, and Graduates

287. Major Critical Thought. A study of major figures in the history of literary criticism. One course. *Duffey or Lentricchia*

INDEPENDENT STUDY

191, 192, 193, 194. Independent Study. Directed reading and research. Students should consult the Director of Undergraduate Studies as early as possible in the preceding term. Up to one course each. *Staff*

195T. Tutorial. Directed reading and research. Students should consult the Director of Undergraduate Studies as early as possible in the preceding term. One course. *Staff*

196, 197, 198. Honors Program Sequence. See *Honors* under THE MAJOR. Three courses. *Staff*

SPEECH AND FILM

71. Essentials of Public Speaking. Designed to give the student practice in making oral presentations with particular attention to the gathering and organization of speech materials. Primarily for freshmen and sophomores. One course. *Staff*

72. Essentials of Public Speaking. Similar to English 71, but primarily for juniors and seniors. Not open to students who have taken English 71. One course. *Staff*

73S. Argumentation. Analysis, investigation, evidence, reasoning, brief making, and refutation. Class debates. Prerequisite: consent of instructor. One course. *Staff*

81. Introduction to Film. C-L: Drama 81 and Film. Half course (summer only) or one course. *Clum or Gaines*

82. The American Film. C-L: Drama 82 and Film. One course. *Clum or Gaines*

188. Literature and the Film. Film versions of novels, short stories, and plays including *Wuthering Heights*, "The Swimmer," *The Trial*, *Who's Afraid of Virginia Woolf*. C-L: Drama 188 and Film. One course. *Clum or Gaines*

189S. Special Topics in Film. A major genre, period, or director. Prerequisite: English 81. C-L: Film. One course. *Clum or Gaines*

RELATED TOPICS

27S. Studies in Nonliterary Topics. May be taken twice. *Staff*

COURSES CURRENTLY UNSCHEDULED

74. Persuasive Speaking

98. College Sports and American Culture

175. The Bible as Literature

181S. Studies in a Single World Author

185. Major Western Authors

187. Readings in European Literature

THE MAJOR

Basic Requirements. English 91 or 93.

Major Requirements. Eight courses on or above the 100 level, to be organized into one of the coherent plans of study listed below. Each plan of study contains an appropriate seminar and one course in each of four areas: (1) in a major author; (2) in English or British literature before 1800; (3) in English or British literature after 1800; and (4) in American literature. The period requirements may also be satisfied by pertinent courses in a literary genre.

1. *English Literature:* four courses in English or British literature to include at least one course before 1800 and one course after 1800; one course in American literature; one course in a major author (Chaucer, Shakespeare, or Milton); one seminar in English or British literature; and one elective.*
2. *American Literature:* four courses in American literature, including a seminar; one course in English or British literature before 1800; one course in English or British literature after 1800; one course in a major author (Chaucer, Shakespeare, or Milton); and one elective.*
3. *Studies in Literary Genre:* three courses in literary genre, including a seminar; one course in English or British literature before 1800; one course in English or British literature after 1800; one course in American literature; one course in a major author (Chaucer, Shakespeare, or Milton); and one elective.* English/drama double majors should take Studies in a Literary Genre with drama as their concentration.
4. *Writing:* four courses in writing; one course in English or British literature before 1800; one course in English or British literature after 1800; one course in American literature; and one course in a major author (Chaucer, Shakespeare, or Milton).

Courses which fulfill area requirements:

English or British literature before 1800: 121, 122, 123, 124, 131 (when before 1800), 136, 139S (when before 1800), 141, 143, 144, 145, 212, 221, 225, 235.

English or British literature after 1800: 125, 126, 127, 128, 131 (when after 1800), 133, 135, 137, 138, 139S (when after 1800), 241, 245, 251.

American literature: 151, 152, 153, 154, 155, 157, 158, 161, 162, 163, 164, 165, 167, 168, 169S, 263, 267, 275.

Studies in a Major Author: 141, 143, 144, 145.

Literary Genre: 131 (when appropriate), 133, 135, 136, 137, 138, 139S (when appropriate), 141, 143, 144, 145, 161 (when appropriate), 162, 163, 164, 165, 169S (when appropriate), 170, 171, 173, 174, 175, 176, 177, 178, 179S, 181S (when appropriate), 182, 183, 184, 225.

Writing: 101S, 103S, 104S, 105S, 106S, 107S, 109S.

Foreign Languages. The department recommends that students majoring in English complete at least two years of college level study, or the equivalent, of a foreign language. Students contemplating graduate work in English should note that many master's programs require examination in one foreign language and that doctoral programs commonly require examination in two.

Honors. The department offers an honors program consisting of a three-semester sequence of study in literature, literary criticism, and literary theory (English 196, 197, and 198), requiring short papers weekly, term papers for 196 and 197, and a senior thesis for 198. Prerequisites: three courses in English with at least a B+ average, and a written recommendation from an English instructor (in courses other than composition). To obtain honors in English, a student must satisfactorily complete all

*English 112 and 115 are recommended supplements to the major's plan of study.

three semesters. Course credit for individual semesters (but not honors) will be given upon satisfactory completion of fewer than the full three semesters. Students wishing to pursue honors must apply to the Department Honors Committee for admission to the program by October 1 of their junior year.

Film

For courses in film, see Institute of the Arts.

Forestry and Environmental Studies (FES)

Students who are preparing for professional careers in natural resources and the environment should refer to the section on undergraduate-professional combination programs in this bulletin. The courses listed below are described fully in the *Bulletin of Duke University: School of Forestry and Environmental Studies*. They are open to undergraduates by consent of the instructor.

- 191, 192. Independent Study. Open to qualified juniors and seniors with consent of the student's major adviser and the instructor. Credit to be arranged. *Staff*
- 194. Conserving Natural Resources. Open to undergraduates only. C-L: Canadian Studies. One course. *Staff*
- 200. Student Projects. Prerequisite: consent of the dean of the School of Forestry and Environmental Studies. Credit to be arranged. *Staff*
- 201. Field Studies. Credit to be arranged. *Staff*
- 203. Silvics. One course. *Staff*
- 204. Forest Inventory, Growth, and Yield. One course. *Davis*
- 205. Silviculture. One course. *Davis*
- 207L. Forest Pest Management. One course. *Stambaugh*
- 208. Fire Behavior and Use. One course. *Staff*
- 209. Forest Entomology. One course. *Staff*
- 210L. Forest Pathology. One course. *Stambaugh*
- 211L. Applied Ecology and Ecosystem Management. One course. *Richardson*
- 212. Ecosystem Dynamics in Forest Productivity. One course. *Boyce*
- 213. Forest Ecosystems. One course. *Binkley*
- 215. Environmental Physiology. Half course. *Di Giulio and Richardson*
- 216. Applied Population Ecology. Half course. *Staff*
- 218. Barrier Island Ecology. Prerequisite: course in general ecology. (Given at Beaufort.) C-L: Botany 218 and Marine Sciences. One and one-half courses. *Staff*
- 221L. Forest Soils. One course. *Binkley*
- 230. Weather and Climate. One course. *Knoerr*
- 231. Environmental Climatology. One course. *Staff*
- 232. Microclimatology. C-L: Botany 232. One course. *Knoerr*
- 234. Watershed Hydrology. One course. *Marin*
- 236. Water Quality Management. One course. *Reckhow*
- 237. Watershed Modeling and Management. Prerequisite: Forestry and Environmental Studies 234. One course. *Knoerr and Marin*
- 251. Natural Resource Data Analysis. One course. *Staff*
- 261. Remote Sensing for Resource Management. One course. *Davison*
- 263. Harvesting and Transportation Systems. Variable credit. *Jayne*
- 264. Manufacturing Systems. One course. *Jayne*
- 267. Wildland and Wildlife Management. One course. *Staff*
- 270. Resource Economics and Policy. Prerequisite: introductory course in economics or consent of instructor. C-L: Public Policy Studies 272. One course. *Hyde*
- 283. Environmental Policy and Values. C-L: Canadian Studies. One course. *Royer*

French

For courses in French, see Romance Languages.

Genetics—The University Program

Professor Antonovics, *Director*, (botany); Professors Amos (immunology), Boynton (botany), Counce (anatomy), Gillham (zoology), Gross (biochemistry), Guild (bio-

chemistry), Joklik (microbiology), Kredich (medicine and biochemistry), Moses (anatomy), Nicklas (zoology), C. Ward (zoology), F. Ward (immunology), and Webster (biochemistry); Associate Professors Bastia (microbiology), Endow (microbiology), Greene (biochemistry), Greenleaf (biochemistry), Keene (microbiology), Linney (microbiology), Modrich (biochemistry), and Steege (biochemistry); Assistant Professors Burdett (microbiology), Hershfield (medicine and biochemistry), Holmes (medicine and biochemistry), Hsieh (biochemistry), Johnston (botany), Kaufman (biochemistry), Kreuzer (microbiology), Schachat (anatomy), and Uyenoyama (zoology); Adjunct Professors Drake (National Institute of Environmental Health Sciences), Judd (National Institute of Environmental Health Sciences), and Lucchesi (University of North Carolina)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Students interested in preparation for advanced work in genetics or wishing to take an interdisciplinary major in this area should consult Professor Antonovics (135 Biological Sciences Building). Information concerning interdisciplinary programs involving biology should be discussed with the appropriate Directors of Undergraduate Studies.

For descriptions of the courses consult the listings under the specified departments.

Introduction to Genetics. (Zoology 117.) One course. *Ward*

Principles of Genetics. (Botany 180, Botany 280, Zoology 180, and Zoology 280.) One course. *Antonovics, Boynton, and Gillham*

Genetic Mechanisms. (Biochemistry 215.) One course. *Gross and staff*

Molecular Biology II: Nucleic Acids. (Biochemistry 268.) One course. *Modrich and staff*

Ecological Genetics. (Botany 285S.) One course. *Antonovics*

Evolutionary Mechanisms. (Botany 286 and Zoology 286.) One course. *Antonovics, Uyenoyama, and H. Wilbur*

Independent Study and Special Problems. (Botany 191, 192, 225T, and 226T; Zoology 191 and 192.) Prerequisites: consent of instructor and the appropriate Director of Undergraduate Studies prior to registration.

Mathematical Population Genetics. (Zoology 288.) Calculus required; statistics and linear algebra recommended. One course *Uyenoyama*

Geology (GEO)

Professor Perkins, *Chairman*; Assistant Professor Baker, *Director of Undergraduate Studies*; Professors Heron and Pilkey; Associate Professors Corliss, Johnson and Rosen-dahl; Assistant Professor Bloomer; Adjunct Assistant Professor Strelitz

10S. Analysis of Outcrops. Field interpretation of geologic features. Includes four field trips. Prerequisite: Geology 1 or 41 (may be taken concurrently). Half course. *Staff*

41. Introduction to Geology. Earth composition, processes, and structure. One course. *Heron and staff*

43S. Application of Geologic Principles. Mineral and rock classification, topographic and geologic map interpretation. Prerequisite: Geology 41 (may be taken concurrently). Half course. *Staff*

53. Introductory Oceanography. C-L: Botany 53. One course. *Pilkey and Searles*

72. History of the Earth. Physical and biological evolution of the earth from the viewpoint of global tectonics. Primarily for science majors. Fee for field trips. Weekend field trip through the Appalachians, and Saturday field trip through the Deep River Triassic Basin. Prerequisite: Geology 41 or consent of instructor. One course. *Corliss*

105. Fundamentals of Mineralogy. Crystal chemistry, crystal physics, mineral identification, and genesis. Lectures or recitations, laboratory, and field trips. Prerequisite: Chemistry 12 (may be taken concurrently). One course. *Bloomer*

106. Igneous and Metamorphic Rocks. Silicate mineralogy, theory of origin and classification of igneous and metamorphic rocks, and rock identification. Lectures and laboratory. Prerequisite: Geology 105. One course. *Bloomer*

108. Sedimentary Rocks. Authigenic and detrital minerals, theory of origin and classification of sedimentary rocks, and rock identification. Lecture, laboratory, and field trips. Prerequisite: Geology 72 or 105 or consent of instructor. One course. *Heron*

111. Stratigraphic Principles and Applications. Prerequisites: Geology 72 and 108 or consent of instructor. One course. *Perkins*

130. Principles of Structural Geology. Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 108. One course. *Rosendahl*

145. Invertebrate Paleontology. Biologic and stratigraphic relationships of invertebrates and their phylogeny. Lectures and laboratory. Prerequisite: Geology 72 or consent of instructor. One course. *Corliss*

191, 192. Independent Study. Directed reading or research. Open only to qualified juniors and seniors by permission of the Director of Undergraduate Studies and supervising instructor. Two courses. *Staff*

195. Independent Study for Nonmajors. Open to qualified juniors and seniors upon approval of the departmental faculty. One course. *Staff*

196S. Beach and Island Geological Processes. Processes affecting evolution of beaches and barrier islands with emphasis on the effect of constructions. (Given at Beaufort on three weekends.) C-L: Marine Sciences. Half course. *Pilkey*

For Advanced Undergraduates and Graduates

200. Beach and Coastal Processes. The study of sediments, sedimentary processes, and geomorphology of nearshore environments. One course. *Pilkey*

203. Physical Oceanography. Physical processes in the oceans: the physical properties of seawater, the dynamics of currents, waves, and tides, and the transmission of light and sound in the sea. Prerequisite: Physics 41 or 51. (Given at Beaufort.) C-L: Marine Sciences. Half course. *Johnson*

204. Chemical Oceanography. An introduction to chemical processes in the oceans: including factors controlling the major ion composition of sea salt, the distribution of dissolved gases in seawater, sediment-seawater interactions, and seawater-basalt interactions at oceanic ridge crests. Prerequisites: Chemistry 11 and Geology 203 (may be taken concurrently). (Given at Beaufort.) C-L: Marine Sciences. One course. *Staff*

205S. Geological Oceanography. The geology of ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. (Given at Beaufort.) C-L: Marine Sciences. One course. *Johnson*

206S. Principles of Geological Oceanography. A survey of geological aspects of the oceans including sediment types, processes of sedimentation, geologic structures of the ocean basins, and bottom physiography. Prerequisite: Geology 108 or consent of instructor. One course. *Pilkey*

208S. Paleooceanography. Application of stratigraphic, paleontologic, and geochemical evidence in sediments to understanding ancient oceans and climates. Prerequisite: Geology 206S or consent of instructor. One course. *Baker*

212. Carbonate Facies Analysis: Recent and Ancient. Origin, distribution, and diagenetic alteration of recent carbonate sediments and their ancient analogs. Prerequisite: Geology 111. One course. *Perkins*

214S. Sedimentary Petrography. Descriptive and interpretive analysis of sediments and sedimentary rocks in thin section, with an emphasis on diagenesis. Prerequisite: consent of instructor. One course. *Perkins*

215. Clastics Facies Analysis: Recent and Ancient. Modern clastic depositional systems and their ancient analogs. Prerequisite: Geology 111. One course. *Heron*

216. Field Analysis of South Florida Carbonates. Analysis of recent sediments and organisms and their Pleistocene analogs. One-week field trip. Prerequisite: Geology 111 or consent of instructor. Pass-fail only. Half course. *Perkins*

217. Field Analysis of Ancient Sedimentary Sequences. Regional analysis of ancient clastic and carbonate systems. One-week field trip. Prerequisite: Geology 111 or consent of instructor. Pass/fail only. Half course. *Heron and Perkins*

249. Marine Micropaleontology. Introduction to marine microfossils, basic principles of micropaleontology and stable isotope geochemistry with applications to paleoceanography. Lectures and laboratory. Prerequisite: Geology 206S or consent of instructor. One course. *Corliss*

251. Physics of the Earth. Origin, primeval evolution, rotation, potential fields, paleomagnetism, gravity anomalies, earthquake seismology, thermal properties, internal structure of the earth, and thermodynamics of plate motions. Prerequisites: Geology 41 and Chemistry 12 and Mathematics 32 and Physics 52 or consent of instructor. One course. *Rosendahl*

252. Exploration Seismology. Elastic wave theory, reflection and refraction of acoustic waves, field methodologies, computer processing, and interpretation of seismic data. Prerequisites: Geology 41 and Mathematics 32 and Computer Science 51 and Physics 52 or consent of instructor. One course. *Rosendahl*

255. Seismic Interpretation. Basic rock physics, seismic expression of structural styles, seismic facies analysis, maps generated from seismic data, and basin-wide seismic stratigraphic analysis. Prerequisite: Geology 251; corequisite: Geology 252 or consent of instructor. One course. *Rosendahl and Staff*

260S. Hydrocarbon Exploration. Origin, migration, and accumulation of hydrocarbons with emphasis on exploration techniques. Prerequisites: Geology 111 and 251. One course. *Perkins and Rosendahl*

270. Geochemistry. Application of chemical principles to geological problems. Prerequisites: Chemistry 12 and Mathematics 32. One course. *Baker*

271. Low-Temperature Geochemistry. Chemistry of aqueous solutions, authigenic minerals, surface chemistry, and stable isotopes in sedimentary systems. Prerequisite: Geology 270 or consent of instructor. One course. *Baker*

281S. Igneous Petrology. Current topics in igneous petrology including andesite petrogenesis, ocean ridge basalts, and experimental petrology. Prerequisites: Geology 105 and 106. One course. *Bloomer*

292. Computer Methods in Geology. Techniques used in the geological sciences including simulation and forward modelling, inverse and least squares methods, statistical methods and exploratory data analysis as well as graphics. Prerequisites: Mathematics 32 and Computer Science 51, or consent of instructor. One course. *Strelitz*

295S. Advanced Topics in Geology. Topics, instructors, and credits to be arranged each semester. *Staff*

COURSES CURRENTLY UNSCHEDULED

1. Introductory Geology

253S. Geophysics

254. Geophysical Field Methods

THE MAJOR

For the A.B. Degree

Prerequisites. Geology 41 and 72; Chemistry 11 and 12; and Mathematics 31 and 32.

Major Requirements. A minimum of eight geology courses above the introductory levels, including 105, 106, 108, 111, 130, and 145.

For the B.S. Degree

The Department of Geology offers two programs:

Geology: Preparatory to Advanced Studies in Geology

Prerequisites. Geology 41 and 72; Chemistry 11 and 12; Mathematics 31, 32; Physics 41 and 42 or 51 and 52; and Computer Science 51.

Major Requirements. Required courses include 105, 106, 108, 111, 130, 145, a field course normally taken during the summer after the junior year, and three other geology courses above the introductory level.

Geology: Preparatory to Advanced Studies in Oceanography

Prerequisites. Geology 41 and 72; Geology 53 (or 206); Chemistry 11 and 12; Physics 41 and 42 or 51 and 52; Biology 14; Mathematics 31 and 32, and two courses of science electives.

Major Requirements. A minimum of seven geology courses above the introductory level, including 105, 106, 108, 111, 130, and 145.

Germanic Languages and Literature

Associate Professor Borchardt, *Chairman*; Assistant Professor Bessent, *Director of Undergraduate Studies and Supervisor of Freshman Instruction*; Professor Phelps; Associate Professors Alt and Rolleston; Assistant Professor Westphal-Wihl; Visiting Professor Jantz; Instructors Johns and Koepfel; Lecturers Dowell and Lauf

GERMAN (GER)

1-2. Elementary German. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory and the computer. Two courses. *Bessent and staff*

14. Intensive German. Accelerated introduction to German, combining in one semester the work of German 1-2. Classroom theory and practice with extended exposure to language laboratory and computer programmed instruction. Prerequisite: consent of Director of Undergraduate Studies. Two courses. *Lauf*

63. Intermediate German. Prerequisite: German 1-2 or equivalent. One course. *Lauf and staff*

German 63 is usually followed by 100, 101, or 117S.

65-66. German in Review. Grammar review, reading of literary and cultural texts, oral practice, laboratory and computer augmented instruction. Prerequisite: German 1-2; 14; or equivalent. Not open to students who have had German 63. Two courses. *Dowell*

100S. Business German. Introduction to the language of commerce and industry; modes of expression for technology and marketing. Prerequisite: consent of instructor. One course. *Koeppel*

101. Introduction to German Literature. Readings from representative German authors. One course. *Bessent*

103S, 104S. Undergraduate Seminars. Topics vary. Two courses. *Staff*

105. Composition. Syntax with practice in the elements of German expository style, recommended for majors. One course. *Bessent and staff*

109S. Nineteenth-Century Prose Fiction. Emphasis on shorter forms: novelle, fairy tale, legend. One course. *Bessent*

115S. Drama. Development of German drama and stagecraft from *Sturm und Drang* to Brecht's *Epic Theater*. C-L: Drama 155S. One course. *Alt*

117S, 118S. German Conversation and Composition. Primarily conversation with oral and written reports, based on works by contemporary writers of East and West Germany. Required for German majors; other students by consent of instructor. Two courses. *Bessent and staff*

125S. German Literature to World War I. Selected nineteenth- and early twentieth-century texts to explore and define elements of the modern. Kleist, Hoffmann, Büchner, Heine, Nietzsche, Thomas Mann. One course. *Alt or Rolleston*

126S. German Literature since World War I. From expressionism to the present, the social and intellectual contexts. Mann, Kafka, Rilke, Böll, Grass. One course. *Rolleston*

127S. Contemporary Germany. The current literary scene in the two Germanies in its cultural, social, and political contexts. C-L: Comparative Area Studies. One course. *Bessent*

129. Deutsche Kulturgeschichte. An analysis of the larger historical, political, and cultural developments and their influences on present-day Germany. C-L: Comparative Area Studies. One course. *Staff*

130. German Life and Thought. German cultural and intellectual history. Reading and discussion in English. Taught in English. C-L: Comparative Area Studies. One course. *Borchardt*

131S. Goethezeit. Goethe and his contemporaries: representative texts and the philosophical background. One course. *Staff*

132. The Romantics. Major writers of the romantic movement (1795-1830) considered in their national and international context. One course. *Rolleston*

172. Modern German Literature in English Translation. Representative works by such writers as Mann, Kafka, Hesse, Brecht, Böll, and Grass. Taught in English. One course. *Borchardt*

173. Goethe's Faust in English Translation. The poem, its place in world literature, its cultural and historical backgrounds. One course. *Borchardt*

175. Consciousness and Modern Society. The blend of philosophy, literature, and sociology in German thinking about actual and possible societies. The idea of consciousness as producing involvement, detachment, or transformation. Marx, Nietzsche, Lukacs, Freud, Marcuse, Benjamin, Adorno, Habermas. Texts and discussion in English. C-L: Comparative Area Studies. One course. *Rolleston*

181. German for Reading, I. Foundations of German grammar and syntax; emphasis on vocabulary and complex verbal structures. Not open for credit to students who have completed German 1-2 or the equivalent. One course. *Staff*

182. German for Reading, II. Advanced reading practice with intensive grammar review; scholarly and technical selections flexibly chosen to accommodate individual student needs. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of Director of Undergraduate Studies. Two courses. *Alt, Bessent, Borchardt, Phelps, Rolleston, or Westphal-Wihl*

193, 194. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by consent of the department. Two courses. *Alt, Bessent, Borchardt, Phelps, Rolleston, or Westphal-Wihl*

For Seniors and Graduates

200S. Proseminar. Fundamental course for advanced study of German. Literary history; schools of criticism; practical exercises in interpretation; and research methods. One course. *Alt*

201S, 202S. Goethe. His life and works, in the light of his lasting significance to Germany and world literature. 201S: lyrics, prose, fiction, and selected dramas. 202S: *Faust I & II*. Two courses. *Staff*

205, 206. Middle High German. The language and literature of Germany's first classical period. C-L: Linguistics and Medieval and Renaissance Studies. Two courses. *Westphal-Wihl*

207S. German Romanticism. The principal writers of the period from 1795 to 1830. One course. *Rolleston*

209S. Drama. Studies in the German-speaking theater with emphasis on the nineteenth century. One course. *Alt*

211S. Nineteenth-Century Literature. From the end of Romanticism through Realism. One course. *Alt*

214S. The Twentieth Century. Literature of the twentieth century presented through representative authors. One course. *Rolleston*

215S. Seventeenth-Century Literature. Leading writers of the baroque, viewed against the background of their time. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

216. History of the German Language. Development of the phonology, morphology, and syntax of German from the beginnings to the present. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Westphal-Wihl*

217S. Renaissance and Reformation Literature. The period from 1400 to about 1600. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

218S. The Teaching of German. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks, related audiovisual materials, and computer programs. One course. *Staff*

219. Applied Linguistics. The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. C-L: Linguistics. One course. *Westphal-Wihl*

COURSES CURRENTLY UNSCHEDULED

230S. Lyric Poetry

YIDDISH (YDH)

171. Yiddish Fiction in Translation. Representative works of the classics (Men-
dele, Peretz, Sholem Aleichem, Asch, Goldfaden) as well as of selected poets. C-L:
Judaic Studies. One course. *Alt*

181, 182. Elementary Yiddish. A thorough study of elementary Yiddish grammar
with reading, composition, and oral practice. No previous knowledge of German or
Hebrew required. C-L: Judaic Studies. Two courses. *Alt*

COURSES CURRENTLY UNSCHEDULED

191, 192. Independent Study

THE MAJOR

Students majoring in German develop language skills in their cultural and literary context. The international and humanistic emphasis makes the German major an appropriate companion to technical and career-oriented concentrations. Numerous opportunities are available, including programs of study abroad, interdisciplinary programs, and Fulbright and German Academic Exchange Service (DAAD) scholarships.

Prerequisites. Elementary and intermediate German.

Major Requirements. Conversation and composition (German 117S, 118S or equivalent), plus six advanced courses, three of which must be at the 200 level. The following courses may not be used to fulfill major requirements: 172, 173, 175, 181, 182.

Honors. Any student who is qualified (see the section on honors in this bulletin) may undertake work toward a degree with distinction in German by applying to the Director of Undergraduate Studies.

Greek

For courses in Greek, see Classical Studies.

Health, Physical Education, and Recreation (PE)

Professor Friedrich, *Chairman*; Associate Professor Spangler, *Director of Undergraduate Studies*; Professors Buehler and Falcone; Associate Professors Eddy, Harvey, LeBar, Lloyd, Raynor, Riebel, Skinner, and Woodyard; Part-time Instructors Gringle, McNutt, Pollard, and Trout; Lecturers Harris and McCraw.

ACTIVITY COURSES

The activity courses listed below may be taken by men and women unless otherwise indicated. Each course carries a half-course credit and is given on a pass/fail basis. The maximum amount of credit that counts for the undergraduate degree is one full course, but additional courses may be taken without credit toward graduation.

10. Adapted Physical Education. Individualized programs for permanently or temporarily disabled students. Half course. *Riebel*

11. Cardiorespiratory Conditioning and Aerobics. Individualized programs in walking, jogging, running, cycling, and swimming. Half course. *Buehler*

12. Dancing for Health. Dancing for cardiovascular and physical conditioning. Half course. *McCraw*

13. Weight Control. Individualized exercise and diet programs. Prerequisite: consent of physician. Half course. *McCraw*

14. Tension Control. Techniques for recognizing and reducing tension. Half course. *Riebel*

15. Weight Training. Progressive, cumulative, and measurable physical conditioning. Half course. *Riebel*

16. Endurance Swimming. Individualized programs to improve skills and fitness. Half course. *Spangler*

20. Beginning Swimming. Propulsion techniques, water safety, introduction to the five basic strokes. Half course. *Spangler*

21. Intermediate Swimming. Development of the five basic strokes, overarm side trudgen, and trudgen crawl. Half course. *Spangler*

22. Advanced Swimming. Skill development and endurance. Half course. *Spangler*

24. Lifesaving. American Red Cross Advanced Lifesaving certification. Half course. *Woodyard*

25. Water Safety Instructors Course. American Red Cross Water Safety Instructors certification. Half course. *Woodyard*

26. Scuba Diving. Half course. *Pollard*

27. Kayaking. Basic skills for kayaking in whitewater. Half course. *Harvey*

28. Canoeing. Basic skills for canoeing in whitewater. Half course. *Riebel*

30. Beginning Golf. Half course. *Eddy*

31. Intermediate and Advanced Golf. Strategy of the game and use of all clubs. Half course. *Eddy*

40. Beginning Tennis. Half course. *LeBar*

41. Intermediate Tennis. Strategy of the game and stroke development. Half course. *LeBar*

42. Advanced Tennis. Stroke development with emphasis on strategy. Half course. *LeBar*

43. Racquetball and Squash. Half course. *Skinner*

44. Badminton and Racquetball. Half course. *Skinner*

45. **Advanced Racquetball.** Development of competitive skills. Half course. *Skiner*
50. **Boxing.** Half course. *Falcone*
51. **Self-Defense: Karate.** Fundamentals of selected martial arts. Half course. *Pollard*
52. **Fencing.** Foils, épée, and saber. Half course. *LeBar*
60. **Volleyball.** Half course. *Wilson*
70. **Folk Dancing.** Dances and music, folklore, and costumes. Half course. *Wray*
71. **Square Dancing.** Calls and steps. Half course. *McCraw*
72. **Social Dancing.** Waltz, foxtrot, tango, cha-cha, rumba, jitterbug, rock, disco, and others. Half course. *Trout*
80. **Equitation.** Skills in balance seat riding: walk, trot, and canter. Half course. *Brunson*
81. **Advanced Equitation: Hunt Seat.** Cross-country and stadium jumping techniques. Half course. *Staff*
90. **Beginning Gymnastics.** Introduction to floor exercises, vaulting, rings, parallel and horizontal bars, balance beam, and side horse. Half course. *Staff*
91. **Advanced Gymnastics.** Development of floor exercises and skills on apparatus. Half course. *Staff*
95. **Wilderness Skills.** Basic and/or intermediate outdoor camping and leadership skills: orienteering, navigation, campcraft, equipment, trip planning, first aid and safety, with emphasis on "learning by doing." Half course. *McNutt*

THEORY COURSES

100. **Advanced First Aid and Cardiopulmonary Resuscitation.** Certification in advanced first aid and CPR. Half course. *McCraw*
102. **Teaching Elementary Physical Education.** Theory and practice in teaching basic skills, rhythms, and games for grades K-6. Half course. *Spangler*
110. **Diet and Nutrition.** Health implications of diet and nutrition: alcohol as food and beverage, anorexia and bulimia, vegetarian options, exercise, "junk" foods, food additives, and other topics. Half course. *Gringle*
112. **Alcohol and Society.** Historical and legal perspectives; alcohol use on college campuses, problem drinking, alcohol dependence, and options for treatment for the alcohol-troubled person. Half course. *Gringle*
134. **Elementary School Health.** Organization of health programs, basic health problems, and teaching methods and materials for grades K-6. Half course. *McCraw*
136. **Health and Fitness.** Theory and practice of personal health: body mechanics, exercise, weight control, and nutrition. Recent research in sports medicine. One course. *Harris*
170. **History of Sports.** Sports from ancient to modern times with an emphasis on sports in America. One course. *Friedrich*
171. **Recreation Leadership.** Concepts and techniques with an emphasis on organizing recreation for special groups. One course. *Friedrich*
174. **Health and the College Student.** A problem-solving approach to health concerns. One course. *Friedrich*

Hindi-Urdu

For courses in Hindi-Urdu, see Asian and African Languages.

History (HST)

Professor A. Scott, *Chairman*; Associate Professor Miller, *Director of Undergraduate Studies*; Professors Cell, Chafe, Colton, C. Davis, Durden, Franklin, Holley, Lerner, Mauskopf, Oates, Richards, W. Scott, TePaske, Witt, and Young; Associate Professors Bergquist, Dirlik, Gavins, Goodwyn, Kuniholm, S. Nathans, Roland, and Wood; Assistant Professors Barnett-Robisheaux, R. Davis, English, Ewald, Gaspar, Gordon, Herrup, Neuschel, and Reddy; Professor in the Faculty of Arts and Sciences Cahow; Professors Emeriti Ferguson, Parker, Preston, Ropp, and Watson; Lecturers E. Nathans and J. Scott.

History courses offer students from all disciplines within the University an opportunity to investigate the past, gain perspective on the present, and improve their critical faculties. History provides an integrating principle for the entire learning process, and students of history gain a sense of human development, an understanding of fundamental and lasting social processes, and a feeling for human interrelatedness. History courses train the mind by improving skills in communicating thought and imagination.

INTRODUCTORY COURSES

Students are urged, but not required, to take two introductory courses before proceeding to advanced-level courses. Majors take a sequence of two introductory courses in history (21, 22; 21S, 22S; 23; 25, 26; 53, 54; 91, 92; 91S, 92S; 93S; or 175, 176). Additional courses may be chosen from this group as electives or part of the departmental major.

21. Europe to the Eighteenth Century. Development and world impact of European civilization, critical evaluation of historical interpretations, investigation of history from primary sources. One course. *Staff*

21S. Europe to the Eighteenth Century. A seminar version of History 21. One course. *Staff*

22. Europe from the Eighteenth Century. Development and world impact of European civilization, critical evaluation of historical interpretations, investigation of history from primary sources. One course. *Staff*

22S. Europe from the Eighteenth Century. A seminar version of History 22. One course. *Staff*

23. Europe to the Eighteenth Century. Readings, lectures, and discussions *in French*; examinations in English. Development and world impact of European civilization, critical evaluation of historical interpretations, investigation of history from primary sources. Satisfies History 21 requirement for history majors. Prerequisite: French advanced placement credit or French achievement test score of 600 or above; or equivalent. One course. *Witt*

25. Introduction to World History: to 1700. The beginning and evolution of civilization; major traditions of Eurasia (Greek, Christian European, Indian, Chinese, Islamic); Africans and American Indians; the European invasion of America; foundations of the European world economy; Europe's preparation for world hegemony. C-L: Comparative Area Studies. One course. *Staff*

26. Introduction to World History: since 1700. Establishment of European political, economic, and cultural hegemony; non-Western responses; the decline of Western hegemony. C-L: Comparative Area Studies. One course. *Staff*

49S. Great Crises in Nineteenth Century America. Periods when the country faced a significant turning point: slavery and expansion; secession and war; Reconstruction; immigration; the rise of industry; and the imperialist impulse. Offered as a Freshman Innovative Seminar. One course. *Franklin*

53. Greek History. C-L: Classical Studies 53. One course. *Boatwright*

54. Roman History. C-L: Classical Studies 54. One course. *Boatwright*

75, 76. The Third World and the West. Economic, social, political, and cultural relationships, 1500 to the present. C-L: Comparative Area Studies. Two courses. *Bergquist, R. Davis, Dirlik, Ewald, Gordon, and Richards*

91. The Development of American Democracy to 1865. The trends vital to an understanding of the United States today. The development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. One course. *Staff*

91S. The Development of American Democracy to 1865. Seminar version of History 91. One course. *Staff*

92. The Development of American Democracy, 1865 to the Present. A continuation of History 91 with emphasis upon the emergence of contemporary problems in the United States. Students who have taken History 93S may not receive credit for History 92. One course. *Staff*

92S. The Development of American Democracy, 1865 to the Present. Seminar version of History 92. One course. *Staff*

93S. Modern American History. Same as History 92, but emphasizing additional topics considered appropriate for the Program in Twentieth Century America. Open only to students in that program. One course. *Staff*

UNDERGRADUATE COLLOQUIA

Colloquia are open without prerequisite to all undergraduates and are designed for the nonspecialist, although history majors may take them for credit. Each colloquium consists of reading and discussion involving an explicit historical theme. Short papers, reports, and a final examination may be required. Unlike seminars, which emphasize materials and methods of historical research, colloquia concentrate on historical literature.

101G, 102G. Introduction to Islamic Civilization. See C-L: Interdisciplinary Courses 162, 163; also C-L: Anthropology 147, 148; Comparative Area Studies; and Religion 162, 163. Two courses. *Lawrence and staff*

UNDERGRADUATE SURVEY COURSES

100. Early Greece and the Near East. C-L: Classical Studies 133. One course. *Oates*

103. The Roman Revolution. C-L: Classical Studies 137. One course. *Oates*

104. The Intellectual Life of Europe, 1250-1600. C-L: Medieval and Renaissance Studies. One course. *Barnett-Robisheaux and Witt*

105, 106. Political and Constitutional History of England. The origins and evolution of the principal institutions of the English government, related to their setting

in a changing society. C-L: Comparative Area Studies, and for 105: Medieval and Renaissance Studies. Two courses. *Herrup*

109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, Interdisciplinary Course 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*

110. Labor Movements in the Americas. Problems of working-class consciousness, organization, and political action; effects of the labor movement on historical developments in the twentieth-century Latin and North American societies. C-L: Comparative Area Studies. One course. *Bergquist*

111. Early America to 1760. Pre-Columbian explorations, European invasion of North America, the evolution of race slavery, and the responses of the native American peoples. One course. *Wood*

112. Era of the American Revolution, 1760-1815. Origins, evolution, and consequences. Attention to economic, social, and geographical questions, as well as military and political. One course. *Wood*

115, 116. History of Africa. Social, political, and economic development in tropical Africa. 115: cultural background and precolonial history. 116: colonial and contemporary times. C-L: Comparative Area Studies. Two courses. *Ewald*

117. Early Modern Europe. The economic, social, and political history of early modern Europe. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Barnett-Robisheaux or Neuschel*

118. Science in the Twentieth Century. One course. *Mauskopf*

120. History of Socialism and Communism. The origins and development of socialist and communist movements from pre-Marxian times to the present. C-L: Comparative Area Studies. One course. *Lerner*

123S. Madness and Society in Historical Perspective. Mental illness and psychiatric treatment from antiquity to the present with special concentration on the nineteenth and twentieth centuries in Europe, America, and Russia. One course. *Miller*

124S. Slave Society in Colonial Anglo-America: The West Indies, South Carolina, and Virginia. The development of slave-based societies and the production of staple crops for export. One course. *Gaspar*

125. The Athenian Empire. C-L: Classical Studies 134. One course. *Oates*

126. Alexander the Great. C-L: Classical Studies 135. One course. *Oates*

127S. History and the Visual Image. Relationships between historical study and the visual image: painting, photography, films, and television. C-L: Film. One course. *Bergquist, TePaske, and Wood*

128. The United States and Latin America. Economic, cultural, political, and diplomatic relationships in the twentieth century. C-L: Comparative Area Studies. One course. *Bergquist*

129. Experiment in Republicanism: the United States, 1787-1860. One course. *S. Nathans*

130. From Victorian to Corporate America, 1820-1900. One course. *S. Nathans*

131. Mexico and the Caribbean from the Wars of Independence to the Present. C-L: Comparative Area Studies. One course. *TePaske*

132. Major South American Nations, 1850 to the Present. Comparative development of export economies of Brazil, Argentina, Colombia, Chile, and Venezuela and impact on social structure, politics, and culture. C-L: Comparative Area Studies. One course. *Bergquist*

133. Medieval Europe, A.D. 300-1400. C-L: Medieval and Renaissance Studies. One course. *Young*

134. Medieval England. From the fifth through the fourteenth centuries. C-L: Medieval and Renaissance Studies. One course. *Young*

135. Political, Economic, and Social History of Europe, 1890-1939. Europe in 1914: the First World War; rise of fascism; the Great Depression; triumph of Hitler in Germany; Spanish Civil War; social politics of the 1930s. C-L: Comparative Area Studies. One course. *Colton*

136. Europe since 1939. Origins and nature of the Second World War; the cold war; Europe since 1945, with emphasis on the West-European nations. C-L: Comparative Area Studies. One course. *Colton*

137. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Anthropology 125, Comparative Area Studies, Political Science 125, and Sociology 125. One course. *Gereffi*

138. Renaissance and Reformation Germany. The interplay of religious, social, economic, and political forces in Central Europe from the eve of the Protestant Reformation through the Thirty Years War: the roles of Luther, urban society, the Peasants' War, commercial expansion, population growth, and the witch craze. C-L: Medieval and Renaissance Studies. One course. *Barnett-Robisheaux*

139. China Since 1949: The People's Republic. The Chinese path to communism and the communist transformation of Chinese society. One course. *Dirlik*

140. Medieval and Early Modern India, Pakistan, and Bangladesh. Surveys the Islamic period of South Asian history from circa 1200 A.D. to 1750 A.D. Special emphasis on the Delhi Sultanate, the Kingdom of Vijayanagara, the Rajput Confederacy, the Mughal Empire, and the Maratha before British conquest. One course. *Richards*

141. Imperial China. A survey course from antiquity to the modern period (eighteenth century). Students will explore social, economic, intellectual, and political themes. C-L: Comparative Area Studies. One course. *R. Davis*

142. China in the Modern World. A survey of modern Chinese history with special emphasis on the nineteenth and twentieth centuries. C-L: Comparative Area Studies. One course. *Dirlik*

143. Traditional and Early Modern Japan. Japan from earliest settlement to 1868; the Heian Court, rise of the samurai, warring states, and the Tokugawa shogunate. C-L: Comparative Area Studies. One course. *Gordon*

144. History of Modern Japan. Japan from 1868 to the present; the Meiji Restoration, industrialization, the new literature, the Great Pacific War, and the "Economic Miracle." C-L: Comparative Area Studies. One course. *Gordon*

145, 146. Afro-American History. The black experience in America from slavery to the present. C-L: Afro-American Studies 145, 146. Two courses. *Gavins*

149. Military History. War, politics, and technology. One course. *Roland*

151. History of Technology. From primitive arts and crafts to the present, with emphasis on Western technology and its relationship to science and society. One course. *Roland*

152. The Decline and Fall of the Roman Empire. C-L: Classical Studies 138. One course. *Oates*

153S. The Insurgent South. Prerequisite: consent of instructor. C-L: Interdisciplinary Course 153S. One course. *Goodwyn*

154. Comparative Study of Revolutions. Marxist and other theories of revolution; case studies of the English, French, Russian, and Chinese revolutions. C-L: Comparative Area Studies. One course. *Cell*

157, 158. The Rise of Modern Science. The development of science and medicine, with attention to cultural and social influences upon science. 157: through Newton. 158: eighteenth to twentieth centuries. Two courses. *Mauskopf*

159S. The Palestine Problem and United States Public Policy. C-L: Comparative Area Studies and Public Policy Studies 175S. One course. *Kuniholm*

160. The United States from the New Deal to the Present. C-L: Women's Studies. One course. *Chafe*

161, 162. History of Modern Russia. 161: origins of Kievan Russia in the ninth century through the reign of Catherine the Great (1762-1796), concentrating on the formation of the imperial state, class elites, and psychological interpretations of the rulers. 162: nineteenth and early twentieth century to the death of Lenin, stressing the opposition movements in society. C-L: Comparative Area Studies. Two courses. *Miller*

163. Foundations of Chinese Civilization. Taught in China. C-L: Anthropology 163 and Comparative Area Studies. One course. *R. Davis, Dirlik, Kunst, and Weller*

164. India, Pakistan, and Bangladesh: 1750 to the Present. Social and economic impact of Western rule, development of nationalism and independence. C-L: Comparative Area Studies. One course. *Richards*

167S. United States and Canadian Constitutional Issues. A comparative study of the development of federalism. C-L: Canadian Studies and Comparative Area Studies. One course. *Cahow*

168S. The Atlantic Slave Trade. The development of the slave trade from the fifteenth century to its abolition in the nineteenth century; organization and mechanics, impact on Europe, Africa, and the Americas. C-L: Comparative Area Studies. One course. *Gaspar*

169S, 170S. The Social History of American Women. C-L: Women's Studies. Two courses. *A. Scott*

171. A History of Women in Europe. Women in Europe since medieval times, with particular attention to economic, social, and intellectual experience. C-L: Comparative Area Studies and Women's Studies. One course. *Neuschel*

173. History of Spain from Late Medieval Times to the Present. Development of the Spanish nation-state from the times of Ferdinand and Isabella, Charles V, and Philip II to the Franco regime and its aftermath. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. The pre-Columbian cultures, European conquest and its effects on the Amerindian peoples, and development of the Spanish and Portuguese Empires to the wars of independence, with special emphasis upon colonial institutions and socio-economic developments. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

177. Modern Latin America. A survey of nineteenth- and twentieth-century economic, social, and cultural change. C-L: Comparative Area Studies. One course. *Bergquist*

183S. Canada from the French Settlement. Problems in the development of Canada and its provinces. C-L: Canadian Studies and Comparative Area Studies. One course. *Cahow*

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, Economics 184, Political Science 184, and Sociology 184. One course. *Leach*

185. American Diplomacy from the Kennedy Administration to the Present. C-L: Public Policy Studies 185. One course. *C. Davis or Kuniholm*

193, 194. Introduction to the Civilizations of Southern Asia. See C-L: Interdisciplinary Courses 101, 102; also C-L: Anthropology 101, 102; Comparative Area Studies; and Religion 160, 161. Two courses. *Lawrence and staff*

ADVANCED COURSES (FOR SENIORS AND GRADUATES)

Students may receive credit for either semester of a hyphenated course at the 200 level without taking the other semester if they obtain written consent from the instructor.

201S. Aspects of Change in Prerevolutionary Russia. Origin and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of the labor movement. C-L: Comparative Area Studies. One course. *Miller*

202S. The Russian Revolution. C-L: Comparative Area Studies. One course. *Miller*

215-216. The Diplomatic History of the United States. Not open to undergraduates who have had History 121, 122. C-L: Comparative Area Studies, and for 215: Canadian Studies. Two courses. *C. Davis*

217S, 218S. Western Europe in the Twentieth Century. Topics in political and social history: Europe in 1900; the impact of two world wars; the social politics of the Great Depression; Fascism and Nazism; economic recovery and changes after 1945. C-L: Comparative Area Studies. One course. *Colton*

219S, 220S. History of Science and Technology. The interaction of science and technology in the Western world from earliest times to the present. Two courses. *Mauskopf and Roland*

221. Problems in the Economic and Social History of Europe, 1200-1700. C-L: Medieval and Renaissance Studies. One course. *Witt*

222. Problems in the Intellectual History of the European Renaissance and Reformation. Prerequisites: History 104 and reading knowledge of German, French, or Italian. C-L: Medieval and Renaissance Studies. One course. *Witt*

227-228. Recent United States History: Major Political and Social Movements. C-L: Women's Studies. Two courses. *Chafe*

229S, 230S. Revolution in Modern Europe, 1789-1919. The French Revolution, the revolutions of 1830 and 1848, the Paris Commune, and the Russian and German revolutions of 1917 and 1918-1919. Emphasis on the evolution of historians' efforts at explanation of revolutions and on the relationship between social and political change. C-L: Comparative Area Studies. Two courses. *Reddy*

231S, 232S. Problems in the History of Spain and the Spanish Empire. C-L: Comparative Area Studies. Two courses. *TePaske*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, Smith, and Valenzuela*

235. The Antebellum South. The economic, political, and social aspects of life in the South, 1820-1860. One course. *Franklin*

236. The Reconstruction Era. The historiography of the Reconstruction and the problems of adjustment in the South in the postwar years. One course. *Franklin*

237S. Europe in the Early Middle Ages. C-L: Medieval and Renaissance Studies. One course. *Young*

238S. Europe in the High Middle Ages. C-L: Medieval and Renaissance Studies. One course. *Young*

239S. History of Socialism and Communism. Problems in the origins and development of socialist and communist movements. C-L: Comparative Area Studies. One course. *Lerner*

241-242. United States Constitutional History. 241: to 1865; 242: 1865 to present. Two courses. *Cahow*

243-244. Marxism and History. Two courses. *Dirlik*

247. History of Modern India and Pakistan, 1707-1857. C-L: Comparative Area Studies. One course. *Richards*

248. History of Modern India and Pakistan, 1857 to the present. C-L: Comparative Area Studies. One course. *Richards*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. Two courses. *Holley*

253S, 254S. European Diplomatic History, 1871-1945. Origins of the First and Second World Wars, the diplomacy of the wars, and the peace settlements which followed them. C-L: Comparative Area Studies. Two courses. *W. Scott*

260S. Economic History of Japan. C-L: Comparative Area Studies. One course. *Staff*

262. Problems in Soviet History. Studies in the background of the Revolution of 1917 and the history and politics of the Soviet state. C-L: Comparative Area Studies. One course. *Lerner*

269S-270S. British History, Seventeenth Century to the Present. Historiography of social structure and social change: English Revolution, party, the Industrial Revolution, class and class consciousness, Victorianism, and the impact of war in the twentieth century. C-L: Comparative Area Studies. Two courses. *Cell*

273S, 274S. Topics in the History of Science. Critical stages in the evolution of scientific thought. Two courses. *Mauskopf*

277S. The Coming of the Civil War in the United States, 1820-1861. One course. *Durden*

278S. The Civil War in the United States and Its Aftermath, 1861-1900. One course. *Durden*

279, 280. Health, Healing, and History. The development of medicine within the broader cultural context from prehistory to the twentieth century. Not open to students who have had History 181, 182. Two courses. *English*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, History 282S, Political Science 282S, and Sociology 282S. One course. *Leach*

285S, 286S. Oral History. Research on race relations and civil rights in the United States in the twentieth century using techniques of oral history. Prerequisite: consent of instructor. Two courses. *Chafe and Goodwyn*

SMALL GROUP LEARNING EXPERIENCES

Independent Study

Independent study is usually undertaken by students concurrently with a course or with an instructor with whom they have had a course. Students should submit to the instructor in writing a detailed description of intent in the study. Both the instructor's consent and approval of the Director of Undergraduate Studies are required for enrollment.

191, 192. Independent Study. One or two courses each. *Staff*

Undergraduate Seminars

See also History 21S, 22S, 91S, 92S, 93S, 123S, 124S, 150S, 153S, 159S, 168S, 183S.

165S, 166S. Seminars in Selected Topics. Course content determined by instructor. Prerequisite: consent of instructor. Two courses. *Staff*

195S, 196S. Seminars for Undergraduates. Opportunities for historical investigation of significant problems. Juniors as well as seniors may apply for admission to these courses and are urged to do so if they expect to be candidates for graduation with distinction in history or if they expect to practice-teach in their senior year. Open to majors and nonmajors. The sections are listed below. Most sections are offered for year-long study and carry two course credits. Sections twenty-five through thirty-two are offered only for one semester and carry one course credit.

1. Renaissance Intellectual History, 1300 to 1600. C-L: Medieval and Renaissance Studies. *Witt*
2. Twentieth-Century Europe. *Colton*
3. Problems in the Social and Intellectual History of the United States. *Holley*
4. Medicine and Society in America. *English*
5. The Age of the American Revolution. *Wood*
6. The Era of the American Civil War, 1820-1900. *Durden*
7. Socialism and Revolution in East Asia. C-L: Comparative Area Studies. *Dirlik*
11. Problems in Modern British History. *Cell*
12. Europe and the World since 1914. *W. Scott*
13. Elizabethan England. C-L: Medieval and Renaissance Studies. *Herrup*
15. The Emergence of Industrial Society in Western Europe, 1780-1914. *Reddy*
16. Science and Society. *Mauskopf*
17. Processes of Development in Traditional and Modern Japan. C-L: Comparative Area Studies. *Gordon*
18. Problems in the History of Russia before 1917. C-L: Comparative Area Studies. *Lerner or Miller*
19. Social Conflict and Political Change in the United States, 1789-1860. *S. Nathans*
20. Comparative Problems in Early Modern European History. C-L: Medieval and Renaissance Studies. *Barnett-Robisheaux or Neuschel*
21. Problems in Indian History. C-L: Comparative Area Studies. *Richards*
22. Problems in Latin American History. C-L: Comparative Area Studies. *Bergquist or TePaske*
23. Issues in the History of Tropical Africa. C-L: Comparative Area Studies. *Ewald*
24. Problems in Recent United States Diplomatic History. *C. Davis*
25. Problems in Twentieth-Century American History. *Chafe*
26. Popular Protest in British Society, 1750-1914. *Staff*
27. Origins of the Cold War. *Kuniholm*
28. The Black Death and the Crisis of Late Medieval Europe. C-L: Medieval and Renaissance Studies. *Barnett-Robisheaux*

29. Problems in the History of Women in Europe. *Neuschel*
30. Traditions in China and the West. C-L: Comparative Area Studies. *R. Davis*
31. Issues in Third World Women's History. One course. *Ewald*
32. Crime and Society: Changing Definitions of Criminality in England and America. One course. *Herrup*

197S-198S. Senior Honors Seminar. Designed to introduce qualified students to advanced methods of historical research and writing and to the appraisal of critical historical issues. Open only to seniors, but not restricted to candidates for graduation with distinction. This course, when taken by a history major, is accompanied by either a year-long 195S-196S seminar or two courses at the 200 level. In unusual circumstances, with consent of the instructor, coordinator of the senior honors seminar, and Director of Undergraduate Studies, 191-192 may replace the two courses of 195S-196S seminars or the two courses at the 200 level. Two courses. *Staff*

Upperclassmen-Graduate Seminars

See History 201S, 202S, 205S, 206S, 209S, 210S, 219S, 220S, 224S, 226S, 229S, 230S, 231S, 232S, 234S, 237S, 238S, 253S, 254S, 255S-256S, 260S, 265S, 267S-268S, 269S-270S, 273S, 274S, 277S, 278S, 282S, 285S, 286S, 287S, and 288S.

COURSES CURRENTLY UNSCHEDULED

- 101K. Topics in Pre-Modern Chinese History
- 107, 108. Social and Cultural History of England
- 113, 114. The United States from the 1890s to World War II
- 121, 122. Diplomatic History of the United States
- 147. History of Weapons
- 148. History of Nuclear Energy
- 150S. U.S. Constitutional History
- 155. Modern Mexico
- 156. Justice and Society
- 172A. Contemporary Science: Issues and Challenges
- 172B. Contemporary Technology: Issues and Challenges
- 178. American Diplomacy during World War II and the Early Cold War: 1939-1961
- 199. Archaeological Field School
- 205S. The Progressive Era in the United States and World War I
- 206S. The Nineteen-Twenties and the New Deal in the United States
- 265S. Problems in Modern Latin American History
- 267S-268S. From Medieval to Early Modern England

HISTORY COURSES BY FIELDS

History courses for undergraduates are offered in five fields, as noted below; students majoring in the department must complete at least one course in each of three fields.

Africa, Asia, Canada, Caribbean, Latin America, Russia. History 26, 75, 76, 101G, 102G, 109, 110, 115, 116, 124S, 128, 131, 132, 141, 142, 143, 144, 155, 159S, 161, 162, 163, 164, 167S, 168S, 174, 183S, 184; 195S-

196S sections 7, 17, 18, 21, 22, 23, 30, 31; 201S, 202S, 231S, 232S, 234S, 239, 247, 248, 255S-256S, 260, 261-262, 265S, 282S, 287-288.

Ancient, Medieval and Renaissance. History 23, 25, 53, 54, 100, 103, 104, 105, 107, 125, 126, 133, 134, 152, 173; 195S-196S sections 1, 13; 221, 222, 237S, 238S, 267S-268S.

Medicine, Military, Science, Technology. History 101H, 123S, 127S, 147, 148, 149, 151, 157, 158, 181, 182, 187, 188; 195S-196S sections 4, 16; 213, 219S, 220S, 273, 274.

Modern Europe. History 21, 21S, 22, 22S, 49S, 101C, 106, 108, 117, 120, 135, 136, 137, 138, 139, 140, 154, 171, 179, 180; 195S-196S sections 2, 10, 11, 12, 14, 20, 26, 28, 29; 218S, 229S, 230S, 253S, 254S.

United States. History 91, 91S, 92, 92S, 93S, 111, 112, 113, 114S, 122, 129, 130, 145, 146, 150S, 153S, 160, 169, 170, 178, 185; 195S-196S sections 3, 5, 6, 19, 24, 25, 27; 205S, 206S, 209S, 210S, 212, 215-216, 227-228, 235, 236, 249-250, 277S, 278S, 285S, 286S.

THE MAJOR

Introductory Courses. Two introductory courses in history (21-22, 21S-22S, 23, 25-26, 53-54, 75-76, 91-92, 91S-92S, 93S).

Major Requirements. Eight courses in history including (1) at least two introductory courses, (2) at least one course in each of three out of the five fields described above, (3) two courses in an undergraduate seminar (195S-196S) or on the 200 level. Students are urged to register for two consecutive courses at this level, but may take two single semester courses with consent of both instructors. Students wishing to take advanced courses in a field are advised to elect the introductory course in that field.

Advanced Placement Credit. Two of the eight courses needed for the major may be fulfilled by advanced placement credits. If two additional advanced placement credits have been granted they may be applied toward the thirty-two credits needed for graduation, but may not be applied to the history major.

Foreign Languages. Majors interested in a particular area of study benefit from knowledge of the language of that area. Majors who contemplate graduate work are reminded of the requirement of a reading knowledge of one or two foreign languages.

Majors Planning to Teach. Majors who plan to teach in secondary schools should consult an adviser in education. Rising juniors who intend to practice-teach in the senior year should take the 195S-196S or 197S-198S seminars or 200-level courses as juniors. History 212 is scheduled in the spring in accelerated sessions to accommodate students who are on campus for half of the semester during the semester they do practice teaching.

Honors. Any student who is qualified (see the section on honors in this bulletin) may apply to the Director of Undergraduate Studies for permission to undertake work leading to a degree with distinction in history.

House Courses (HC)

See the chapter "Academic Procedures and Information" for information on house courses.

Human Development

Professor Maddox (sociology, psychiatry, and Center for Aging and Human Development), *Director*

The goal of this interdisciplinary program is to broaden and enhance the perspectives of students interested in human development. The program seeks to foster an understanding and appreciation of how biological and psychosocial factors act together in development throughout the life course; highlight the ways in which different disciplines conceptualize and study development; demonstrate the complementarity of disciplinary perspectives; and facilitate dialogue among faculty and

students, illustrating the complementarity of and necessity for multidisciplinary perspectives.

Achievement of the program's goal is facilitated by an integrated curriculum of required and elective courses, a research apprenticeship, a lecture series, and other special events. An active advisory procedure assists students in planning learning opportunities. A certificate is available for students who complete program requirements. Participation in selective parts of the program and in the advisory system, however, is available to all undergraduates whether or not they seek the certificate.

The curriculum includes six courses, completion of which is required for the program certificate.

Interdisciplinary Course 124. Approaches to Human Development. *Staff*

Either Psychology 170A (Biological Psychology of Human Development, *Thompson and staff*) or Interdisciplinary Course 180, C-L: Psychology 130 and Sociology 169 (Psychosocial Aspects of Human Development, *Martin Lakin and Maddox*)

Interdisciplinary Course 190. Research Apprenticeship in Human Development. *Staff*

Interdisciplinary Course 191S. Senior Seminar in Human Development. *Staff*

Two elective courses chosen from an illustrative list of biological, psychological, and social scientific courses affiliated with the program published in the program brochure.

The Research Apprenticeship arranged through the program and the related Senior Seminar would ordinarily be available only to students seeking the program certificate. Other components of the program are available to all undergraduates.

Institute of the Arts

Associate Professor Applewhite (English), *Director. Fellows:* Professors Bone (music), Bryan (music), Clum (drama), Douglass (music), Hanks (music), Price (English), Spencer (art), and Withers (music); Associate Professors Goffen (art), Pope (English), Pratt (art), Stars (art), and Wray (dance); Assistant Professors Henry (music), Jaffe (music), Kremen (psychology), and Porter (English); Adjunct Associate Professor B. Ward (philosophy); Visiting Professor R. Ward (music); Lecturers Harris (film), Herman (drama), Hill (drama), Judd (drama), Love (music), and Storer (drama); Artists-in-Residence Davis (dance), Desmond (dance), Dickinson (dance), and Wynkoop (music); Artist-in-Residence and Director of Jazz Studies Jeffrey (music); Visiting Artist-in-Residence Berg (music); Artist Associates Bloom (music), Raimi (music), and Taylor (music); Director of Chapel Music Smith; Director of Cultural Affairs Coon; Staff Associates Arcus (music) and Troxler (music); Technical Director Gaddy (drama).

The Institute of the Arts, established in 1981, coordinates activities in the performing and creative arts, thus encouraging the interrelationship of programs in dance, drama, film, imaginative writing, musical performance and composition, and studio art. Advisers for interdepartmental concentrations and for Program II proposals are offered by the institute. All performing and creative artists are fellows, whether regular faculty members or distinguished artists in residence. The institute assembles representatives of the various artistic disciplines into a single body for the planning of interdisciplinary courses, yearly themes, and special events. A perception of the continuity among the arts is thus encouraged. Courses and festivals sponsored by the institute bring together different art forms, integrating aesthetic appreciation with historical study and critical analysis. Student awards, honors projects, performances, and exhibitions are sponsored. The institute also offers Arts in New York, a one-semester residency program. It provides academic and professional experiences to selected juniors and seniors interested in studying the arts.

Courses offered in art design, dance, drama, film, imaginative writing, musical performance and composition, and interdisciplinary courses in the arts, as well as courses offered by the institute itself, are listed below. Those in art design, imaginative writing, and musical performance and composition are described more fully under the Departments of Art, English, and Music, respectively.

Students may major in art design, drama, English with an emphasis on writing, or in music. Combined majors may be formed according to the rules of the interdepartmental concentration. The major in drama is described below; the majors in art, English (writing), and music are described under the appropriate departments.

Students seeking further information on the Institute of the Arts should consult the office of the Institute of the Arts, 120 East Duke Building.

INSTITUTE OF THE ARTS (AI)

101S. Arts Resources in New York. Studies of the arts in performances and exhibits. Discussions, critical papers, and reports. One course. *Pratt and staff*

102. Arts Internship in New York. Exposure to the practice of the arts through apprenticeship to a sponsoring artist, scholar, or organization. Prerequisite: approval of Duke faculty adviser. Offered only on the pass/fail basis. One course. *Staff*

181S. Art and Its Making. An inquiry into artistic process from a conceptual survey of dominant views to direct interviewing of and discussion with artists. Prerequisites: junior or senior standing and consent of instructor. C-L: Interdisciplinary Course 181S and Psychology 181S. One course. *Kremen*

DANCE (DAN)

Associate Professor Wray, *Coordinator of the Dance Program*; Part-time Instructors Blair and Dorrance; Artists-in-Residence Davis, Desmond, and Dickinson

Activity and theory courses are offered for undergraduate men and women who have special interest in dance as an art form. Although no major in dance exists, Program II provides the possibility of interdisciplinary study of dance in relation to other art forms. Summer courses are available through the American Dance Festival. All dance activity courses (1-99) are offered only on the pass/fail basis.

Activity Courses

60. Beginning Modern Dance I. Modern dance as an art form: techniques, choreography, history, philosophy, and aesthetics. Half course. *Blair*

61. Beginning Modern Dance II. Prerequisite: Dance 60. Half course. *Blair*

62. Intermediate Modern Dance I. Prerequisite: Dance 61. Half course. *Staff*

63. Intermediate Modern Dance II. Prerequisite: Dance 62. Half course. *Staff*

64. Advanced Modern Dance. Prerequisite: Dance 63. Half course. *Staff*

65. Beginning Improvisation. Prerequisite: Dance 61. Half course. *Staff*

70. Ballet I. Prerequisite: one year of training in the strict classical form. Half course. *Dorrance*

71. Ballet II. Prerequisites: two years of ballet and consent of instructor. Half course. *Dorrance*

79. African Dance Technique. Half course. *Davis*

80. Individual Dance Program. Half course. *Staff*

81. Repertory. The study of choreography and performance through participation in the mounting of a dance work from inception through rehearsal to performance. Prerequisite: consent of instructor. Variable credit. *Staff*

Theory Courses

131S, 132S. History of Dance. Emphasis on form, structure, and content related to culture of eras. Two courses. *Wray*

133. History of Black Dance. A survey of black dance in Africa, America, and the Caribbean during the eighteenth, nineteenth, and twentieth centuries. One course. *Davis*

135, 136. Principles of Contemporary Dance Composition. Prerequisites: Dance 60, 61, and 62 or consent of instructor. Two courses. *Desmond*

181. Special Topics. Content to be determined by the instructor. Prerequisite: consent of instructor. One course. *Desmond*

183. Dance and Dance music, 1600-1800. Court, folk, and social dances from Europe, emphasizing the relationship of dance to music. Music or dance skills are useful, but not required. One course. *Troxler and Wittman*

191, 192. Independent Study. Two courses. *Staff*

Courses Currently Unscheduled

134. Creative Movement for Children

139. Movement Connotations

197. Aesthetics of Twentieth-Century Dance

198. Sacred Dance

DRAMA (DRA)

Professor Clum (English), *Director of the Program in Drama and Chairman of the Interdisciplinary Committee on Drama*; Professors Cordle (French), Krynski (Slavic languages), and Stewart (Romance languages); Associate Professors Alt (German) and Burian (classical studies); Assistant Professors Gaines and Sandler (English); Adjunct Professor Azenberg; Lecturers Herman, Hill, Judd, and Storer; Technical Director Gaddy

Practical Theater

90. Introduction to Theater Arts. Elements of theater production—including acting, directing, design, criticism, and administration—and their relationship to educational, commercial, and community theater. Laboratory. One course. *Hill and Staff*

91. Acting. Introduction to the elements of the actor's craft. Improvisation, basic voice and movement exercises, monologues and scene work. One course. *Staff*

92. Stage Technology. An introduction to the skills and crafts of scenic, costume, and properties construction and makeup application. Laboratory. One course. *Staff*

101. Voice and Diction for Actors. Clarity of individual speech, articulation and resonance, expression of the spoken word, and breath support. Students will present a portfolio of individually designed material. One course. *Storer*

102. Movement for Actors. Enhancement of endurance, flexibility, strength, balance, and co-ordination. Also gesture, physical manifestation of emotion, and relaxation on stage. One course. *Staff*

103. Advanced Acting. Advanced work in interpretation and work in classical, modern, comic and serious scenes. Prerequisites: Drama 91, 101, or consent of instructor. One course. *Clum or Storer*

104S. Advanced Scene Study. Seminar in research into historical, psychological, and technical interpretation. Prerequisites: Drama 91, 101, 102, and 103. One course. *Clum or Storer*

110S. Directing. Introduction to the primary methods and processes of directing; including casting, blocking, and interpretation. Prerequisites: Drama 91 and 92. One course. *Storer*

112S. Writing: Drama. Prerequisite: consent of instructor. C-L: English 107S and Film. One course. *Clum or Sandler*

120S. Drawing and Rendering for the Designer. Basic representational drawing using eye training methods. Applied through the use of photographic and life sources. One course. *Herman*

121. Scenographic Techniques. Theory and practice in technical drawing and drafting to scale; pattern drafting in scale and full size. Laboratory. Prerequisite: Drama 92. One course. *Staff*

122. Stagecrafts. Advanced studies in materials and techniques for scenic, costume, and properties designers and technicians. Laboratory. Prerequisite: Drama 92. One course. *Judd*

123. Costume Crafts. Special problems in costume and accessory construction including special materials and techniques. Laboratory. Prerequisite: Drama 92. One course. *Herman*

125. Stage Makeup. Theories and techniques of makeup application; fundamentals of historical styles of stage makeup design. Laboratory. One course. *Herman*

127. Lighting Technology. History, electrical theory, instrumentation, drafting of light plots. Laboratory. One course. *Judd*

131S. Fundamentals of Design and Introduction to Color. Theory of design and color; the special processes and dynamics involved in scenic, costume, and lighting design. Laboratory. Prerequisites: Drama 120 or Art 53. One course. *Staff*

132S. Scenic Design. Advanced class in which the skills and knowledge learned in previous classes and production are applied to specific scenic design projects. Laboratory. Prerequisites: Drama 92, 120S (or Art 53), 121, 131S, and portfolio review. One course. *Judd*

133S. Costume Design. Advanced class in which the skills and knowledge learned in previous classes and production are applied to specific costume design projects. Laboratory. Prerequisites: Drama 92, 120S (or Art 53), 121, 131S, and portfolio review. One course. *Herman*

134S. Lighting Design. Advanced class in which the skills and knowledge learned in previous classes and in production are applied to specific lighting design projects. Laboratory. Prerequisites: Drama 120 (or Art 53), 121, 124, 131S, and portfolio review. One course. *Judd*

135S. Theater Administration. Practical aspects of managements: budgets, personnel, organization, fund-raising, repertory, and publicity. Laboratory. One course. *Staff*

171. Special Topics in Practical Theater. Makeup, mime, movement, etc. Half course. *Staff*

180S. Senior Major Seminar. The subject will vary each year. Required of senior majors. One course. *Staff*

181S. Conference on Special Topics. Variable credit. *Staff*

191-194. Independent Study. Intensive study or special projects in theater history or practical theater approved by the Committee on Drama. One course. *Staff*

Dramatic Literature

64. The Drama. C-L: Classical Studies 64. One course. *Burian*

81. Introduction to Film. Basic principles of film and film criticism through the study of works by Lumière, Méliès, Griffith, Hitchcock, Renoir, Bergman, and others. C-L: English 81 and Film. One course. *Clum or Gaines*

82. The American Film. A survey history focusing on the work of major directors and examples of important genres. C-L: English 82 and Film. One course. *Clum or Gaines*

140. European Theater History to 1800. From the Greek and Roman theater to the Restoration. Innovations and changes in acting and directing theories; theater architecture and scene design; relationship of performer and audience; and organization of theater as a social institution. One course. *Hill*

141, 142. Shakespeare. C-L: English 143, 144. Two courses. *DeNeef, Jones, Porter, Randall, or G. Williams*

143. Western Drama, Classical to Neoclassical. C-L: English 182. One course. *Clum or Sandler*

144. Western Drama from 1800 to 1914. C-L: English 183. One course. *Clum or Sandler*

145. Modern Continental Drama. C-L: English 184. One course. *Sandler*

146. Twentieth-Century American Drama. C-L: English 162. One course. *Clum*

148. Modern British Drama. C-L: English 133. One course. *Clum*

152. French Comedy. C-L: French 151. One course. *Stewart*

154S. French Drama of the Twentieth Century. C-L: French 162. One course. *Cordle*

155S. Drama. C-L: German 115S. One course. *Alt*

165. Introduction to the World of Chekhov. See C-L: Russian 177; also C-L: Comparative Area Studies. One course. *Krynski*

188. Literature and the Film. C-L: English 188 and Film. One course. *Clum or Gaines*

Courses Currently Unscheduled

151. Theory and Form of Tragedy

163. Slavic Drama and Theater of the Twentieth Century

172. The Musical Theater

The Major

Prerequisites. Drama 91 and 92.

Major Requirements. A minimum of three 100-level courses in practical theater from the offerings of the Drama Program including Drama 180S. Also, Drama 140 and at least three additional courses in dramatic literature, theater history, or drama criticism.

FILM

Assistant Professor Gaines, *Chairman of the Committee on the Study of Film*

The courses are described in the listings of the specified departments.

Department of Art and Art History

101, 102. Photography. *Staff*

Comparative Literature

177. Film Theory. *Gaines*

185. Psychoanalysis, Literature, and Film. *Gaines*

Drama/English

81. Introduction to Film. *Clum or Gaines*

82. The American Film. *Clum or Gaines*

112S/107S. Writing: Drama. *Clum or Sandler*

188. Literature and the Film. *Clum or Gaines*

English

189S. Special Topics in Film. *Clum or Gaines*

French

122. The French Film. Taught in English. *Staff*

History

127S. History and the Visual Image. *Bergquist, TePaske, and Wood*

Italian

137. The Italian Cinema. *Staff*

Political Science

153, 154. Politics and the Media of Mass Communication. *Paletz*

203S. Politics and the Media of Mass Communication. *Paletz*

Public Policy Studies

176S. American Communities: A Photographic Approach. *Harris*

178S. Visual Language and Policy Choice. *Cole, Harris, and Payne*

Sociology

170. Mass Communication. *Smith*

INTERDISCIPLINARY COURSES

170. Romanticism in the Arts. C-L: Music 170. One course. *Applewhite, B. Ward, or R. Ward*

181S. Art and Its Making. Prerequisites: junior or senior standing and consent of instructor. C-L: Institute of the Arts 181S and Psychology 181S. One course. *Kremen*

Courses in the creative and performing arts are also offered by the Department of Art and Art History, the Department of English (imaginative writing), and the Department of Music. These courses are cited below and are described fully under the appropriate department.

ART DESIGN (Department of Art and Art History)

Professor Spencer; Associate Professors Pratt and Stars; Part-time Instructors Menapace and Smith

53. Drawing. *Smith or Stars*

54. Two-Dimensional Design and Color. *Smith*

101, 102. Photography. *Staff*

103, 104. Painting. *Pratt*

105, 106. Advanced Drawing and Color. *Pratt*

107, 108. Printmaking. *Staff*

112. Ceramics. *Stars*

113. Advanced Studies in Ceramics. *Stars*

114S. Old Master Techniques. *Stars*

180S. Theory of Design. *Pratt*

203, 204. Advanced Painting. *Pratt*

217, 218. Individual Project. *Staff*

Courses Currently Unscheduled

50. Introduction to Design
56. Three-Dimensional Design
109. Figurative Sculpture
110. Sculpture
209, 210. Advanced Sculpture

The Major

The major in art design is described under the Department of Art and Art History.

IMAGINATIVE WRITING (Department of English)

Professor Price; Associate Professors Applewhite and Pope; Assistant Professor Porter

28S. Introduction to Creative Writing. *Staff*
61S. Writing: Prose Fiction and Drama. *Staff*
62S. Writing: Poetry. *Staff*
103S, 104S. Writing: Short Stories. *Applewhite, Pope, Porter, or Price*
105S. Writing: Longer Prose Narrative. *Price*
106S. The Writing of Poetry. *Applewhite*
107S. Writing: Drama. *Staff*
109S. Special Topics in Writing. *Staff*

The Major

The major in English with an emphasis on writing is described under the Department of English.

MUSIC PERFORMANCE AND COMPOSITION (Department of Music)

Professor Douglass, *Chairman*; Assistant Professor Henry, *Director of Undergraduate Studies*; Professors Bone, Bryan, Hanks, and Withers; Associate Professors Seebass and Todd; Assistant Professors Agawu, Bartlet, and Jaffe; Visiting Professor R. Ward; Artists-in-Residence Berg, Ciompi, Jeffrey, Muti, and Wynkoop; Instructor Higgins; Lecturer Love; Artist Associates Bloom, Raimi, and Taylor; Staff Associates Arcus, Cabbage, Gilmore, Gress, Hawkins, Johnston, Ketch, Lail, Mizesko, Peck, Pederson, Rossman, Ruggero, Troxler, and Weddle; Librarian Hammond

Theory and Composition

55. Introduction to Music Theory. *Troxler*
65. Fundamentals of Music Theory. *Agawu, Jaffe, or Wynkoop*
66. Tonal Harmony. *Agawu, Jaffe, or Wynkoop*
67S, 68S. Composition I. *Jaffe or Ward*
115S. Modal Counterpoint. *Higgins*
116S. Tonal Counterpoint. *Higgins*
122. Orchestration. *Bryan or Jaffe*
129. Choral Conducting. *Wynkoop*
130T, 131T. Performance Practice (Organ) I, II. *Douglass*
132T, 133T. Performance Practice (Organ) III, IV. *Douglass*
215, 216. Problems in Music Analysis. *Agawu*

Literature

74. Introduction to Jazz. *Jeffrey*
119. The Humanities and Music. *Bartlet or Seebass*

Independent Study and Seminars

Admission to these courses is subject to the approval of the Director of Undergraduate Studies in music and the instructor. The instructor and course content will be established in accordance with the individual student's interests and capacities. See Department of Music.

Applied Music

57S, 58S, 59S, 60S. Vocal Diction. Four half courses. *Hanks*

Instruction: half hour, quarter course credit

79. Class Voice. *Lail*

80. Piano. *Hawkins, Love, Ruggero, or Withers*

81. Strings. *Berg, Bloom, Cabbage, Taylor, or Raimi*

82. Woodwinds. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*

83. Brass. *Bryan, Gress, Ketch, or Mizesko*

84. Percussion. *Staff*

85. Voice. *Hanks, Lail, or Peck*

86. Organ. *Arcus or Douglass*

87. Harpsicord. *Arcus*

Instruction: 1 hour, half course credit

90. Piano. *Hawkins, Love, Ruggero, or Withers*

91. Strings. *Berg, Bloom, Cabbage, Taylor, or Raimi*

92. Woodwinds. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*

93. Brass. *Bryan, Gress, Ketch, or Mizesko*

94. Percussion. *Staff*

95. Voice. *Hanks, Lail, or Peck*

96. Organ. *Arcus or Douglass*

97. Harpsicord. *Arcus*

Ensemble Classes: quarter course credit; pass/fail

100. Symphony Orchestra. *Muti*

101. Wind Symphony. *Bryan*

102. Marching Band. *Henry*

103. Jazz Ensemble. *Jeffrey*

106. Chamber Music. *Staff*

110. Collegium Musicum. *Johnston*

111. Opera Workshop. *Hanks*

113. Chorale. *Wynkoop*

The Major

The major in music is described under the Department of Music.

Interdisciplinary Courses (IDC)

21S. Freshman Seminar: Topics in Medieval Studies. Topics will vary according to instructor; perspectives from history, literature, religion, philosophy, and the arts. C-L: Medieval and Renaissance Studies. One course. *Staff*

22S. Freshman Seminar: Topics in Renaissance Studies. Topics will vary according to instructor; perspectives from history, literature, religion, philosophy, and the arts. C-L: Medieval and Renaissance Studies. One course. *Staff*

101, 102. Introduction to the Civilizations of Southern Asia. Hindu, Islamic, and Buddhist foundations; impact of the West; and emergence of the modern nation-states of southern Asia. 101: traditional Hindu civilization and Islamic impact on southern Asia. 102: Western influences and the development of modern societies and states in southern Asia. C-L: Anthropology 101, 102, Comparative Area Studies, History 193, 194, and Religion 160, 161. Two courses. *Lawrence and staff*

103. An Introduction to Women's Studies. Gender roles, their place in American culture, and the twentieth century feminist movement. Use of the perspectives of the social sciences, the natural sciences, and the humanities. Emphasis on integrating the study of women, women's history, experience, and modes of expression into the traditional disciplines. C-L: Women's Studies. One course. *O'Barr and staff*

107S, 108S. Science, Technology, and Human Values. Open to seniors in the Science, Technology, and Human Values Program and to other seniors if space is available. Prerequisite: consent of instructor. Credit by arrangement: the pair, or either 107S or 108S, may be taken for one course credit. Two half courses or one course. *Roland and staff*

109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*

111. Introduction to Linguistics. C-L: Anthropology 107, English 111, and Linguistics. One course. *Staff*

119. Current Topics in Linguistics. C-L: Anthropology 112, English 119, and Linguistics. One course. *Staff*

120. Perspectives on Food and Hunger. Issues of world food and hunger from an interdisciplinary perspective. Lectures present analytic approaches from the natural sciences, social sciences, and the humanities. C-L: Comparative Area Studies. Half course. *Johns*

120A. Perspectives on Food and Hunger. See Interdisciplinary Course 120. Lectures (as described in Interdisciplinary Course 120), discussion meetings, and individual projects. C-L: Comparative Area Studies and Political Science 176. One course. *Johns*

124. Approaches to Human Development. Perspectives from a variety of disciplines: theoretical approaches and their applications. Influential books and seminal topics in disciplines that have shaped contemporary thinking about human development. C-L: Human Development. One course. *Staff*

125. Strategies of Comparative Analysis. Comparative research and analysis in the social sciences and the humanities: strengths and weaknesses of cross-cultural comparison as developed by sociologists, historians, political scientists, anthropologists, and specialists in comparative literature and religion. C-L: Anthropology 125, Comparative Area Studies, History 137, Political Science 125, and Sociology 125. One course. *Staff*

150S. Comparative Area Studies Senior Seminar. Open to seniors majoring in Comparative Area Studies and to other seniors if space is available. Prerequisite: consent of instructor. One course. *Gereffi*

153S. The Insurgent South. Prerequisite: consent of instructor. C-L: History 153S. One course. *Goodwyn*

160S. Topics in Medieval and Renaissance Studies. Interdisciplinary perspectives from the arts, history, literature, philosophy, and religion. For juniors and seniors and Medieval and Renaissance Studies majors, or with consent of instructor. Prerequisite: one course in Medieval and/or Renaissance periods. C-L: Medieval and Renaissance Studies. One course. *Staff*

162, 163. Introduction to Islamic Civilization. Extensive survey of Muslim peoples and institutions. 162: the Middle Eastern origins and cultural attainments of medieval Islam. 163: modern developments and global features of the Islamic world. C-L: Anthropology 147, 148; Comparative Area Studies; History 101G, 102G; and Religion 162, 163. Two courses. *Lawrence and staff*

170. Romanticism in the Arts. The literary, visual, and musical arts of the nineteenth century examined in their historical and theoretical context. Manifestations in the works of Goethe, Wordsworth, Balzac; Friedrich, Delacroix, Turner; Beethoven, Schumann, Berlioz; and others. Developments and continuities in sensibility and style. Guest lecturers, coordinated performances. C-L: Music 170. One course. *Aplewhite, B. Ward, or R. Ward*

180. Psychosocial Aspects of Human Development. The connectedness of societal, behavioral, and biological components of normal development from childhood

through old age; society as the context in which individuals develop over the lifespan. Introductory work in anthropology, psychology, or sociology is recommended. C-L: Human Development, Psychology 130, and Sociology 169. One course. *Martin Lakin and Maddox*

181S. Art and Its Making. An inquiry into artistic process from a conceptual survey of dominant views to direct interviewing of and discussion with artists. Prerequisites: junior or senior standing and consent of instructor. C-L: Institute of the Arts 181S and Psychology 181S. One course. *Kremen*

184. An Introduction to Canada and Canadian Issues. A survey of the main geographic, historical, economic, governmental, and political facets that have shaped modern Canada and an examination of persistent and current issues facing the Canadian nation. C-L: Canadian Studies, Comparative Area Studies, Economics 184, History 184, Political Science 184, and Sociology 184. One course. *Leach*

190. Research Apprenticeship in Human Development. Part of the Undergraduate Program in Human Development. Supervised work may be in a laboratory, project, or organizational setting. Prerequisite: consent of the instructor. C-L: Human Development. One course. *Staff*

191S. Senior Seminar in Human Development. Prerequisite: consent of instructor. C-L: Human Development. One course. *Staff*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, History 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, Smith, Trouillot, and Valenzuela*

282S. Canada. Topics vary each semester; recent perspectives have included nationalism, Canadian-American relations, regionalism in the Maritimes and the West, and cross-border environmental issues, among others. C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, Political Science 282S, and Sociology 282S. One course. *Leach*

COURSES CURRENTLY UNSCHEDULED

99. Perspectives in Archaeology

104. Public Policy and the Marine Environment

105. Austrian Culture

Italian

For courses in Italian, see Romance Languages.

Japanese

For courses in Japanese, see Asian and African Languages.

Judaic Studies—Cooperative Program at Duke and UNC-Chapel Hill

Professor E. Meyers (religion), *Director*; Professor Wintermute (religion); Associate Professors Alt (Germanic languages and literature), Bailey (Divinity School), Bland (religion), Halperin (religion), and C. Meyers (religion)

A program in Judaic studies may be taken as part of a major in religion or as a supplement to any other major. It may also be taken under Program II. Students are eligible for a certificate in Judaic studies after completing four courses in the program.

For descriptions of the courses consult the listings under the specified departments.

German

- 171. Yiddish Literature in Translation. *Alt*
- 181, 182. Elementary Yiddish. *Alt*

Religion

- 50. The Old Testament. *C. Meyers, E. Meyers, Peters, and Wintermute*
- 51. Introduction to Judaic Civilization. *Bland or E. Meyers*
- 100. Selected Studies in the Bible: Pentateuch. *Staff*
- 101. Selected Studies in the Bible: Prophets. *Staff*
- 102. Selected Studies in the Bible: Writings. *Staff*
- 105. Theology of the Old Testament. *Wintermute*
- 109. Women in the Biblical Tradition: Image and Role. *C. Meyers*
- 110. Archaeology and Art of the Biblical World. *C. Meyers or E. Meyers*
- 115-116. Introduction to Biblical Hebrew. *Bailey*
- 131D. Principles of Archaeological Investigation. *C. Meyers or E. Meyers*
- 132D. Palestine in Late Antiquity. *E. Meyers*
- 133. Foundations of Post-Biblical Judaism. *E. Meyers*
- 134. Jewish Mysticism. *Bland*
- 135. Jewish Religious Thought. *Bland*
- 136. Contemporary Jewish Thought. *Bland or E. Meyers*
- 139. Modern Hebrew. *Staff*
- 195B, 196B. Junior-Senior Seminars. *Staff*
- 207, 208. Intermediate Biblical Hebrew. *Staff*
- 220. Rabbinic Hebrew. *E. Meyers or staff*
- 221. Readings in Hebrew Biblical Commentaries. *Bland*
- 238. Jewish Responses to Christianity. *Bland*
- 244. The Archaeology of Palestine in Hellenistic-Roman Times. *C. Meyers or E. Meyers*

Opportunities for independent study are offered in the Department of Religion under 191, 192, 193, 194. Procedures for registration and applications are available in 118 Gray Building.

Special attention is directed to those courses in New Testament which are relevant to the study of Rabbinic Judaism, i.e., Religion 106, 107, 108, and 111. A list of appropriate courses at the University of North Carolina at Chapel Hill is available in 230C Gray Building, Duke University, and in 101 Saunders Hall, University of North Carolina, Chapel Hill.

Latin

For courses in Latin, see Classical Studies.

Linguistics

Students interested in the study of language as part of their undergraduate program or as preparation for graduate work in linguistics should consult the instructors of the courses listed below or Associate Professor Butters, Chairman, Committee on Linguistics, 138 Social Sciences. Students may concentrate in linguistics through Program II. For descriptions of the following courses see the listings of the specified departments:

Anthropology

- 107. Introduction to Linguistics. *Staff*
- 112. Current Topics in Linguistics. *Staff*
- 116. Language, Ethnicity, and New Nations. *Apte*
- 118. The Language of Advertising. *O'Barr*
- 119. Language, Culture, and Society. *Apte or Weller*
- 211S. Ethnography of Communication. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, Trouillot, Weller, or Williams*

English

- 111. Introduction to Linguistics. *Staff*
- 112. English Historical Linguistics. *Butters or Nygard*

- 115. Present-Day English. *Butters or Nygard*
- 118. The Teaching of Composition, Grammar, and Literature in the Secondary School. *Nygard*
- 119. Current Topics in Linguistics. *Staff*
- 208. History of the English Language. *Butters or Nygard*
- 209. Present-Day English. *Butters or Nygard*

French

- 131S. French in the New World. *Hull*
- 210. The Structure of French. *Hull*
- 211. History of the French Language. *Hull*

German

- 205, 206. Middle High German. *Westphal-Wihl*
- 216. History of the German Language. *Westphal-Wihl*
- 219. Applied Linguistics. *Westphal-Wihl*

Interdisciplinary Courses

- 111. Introduction to Linguistics. *Staff*
- 119. Current Topics in Linguistics. *Staff*

Philosophy

- 103. Symbolic Logic. *Brandon or Posy*
- 109. Philosophy of Language. *Posy*

Psychology

- 134. Psychology of Language. *Day*
- 220S. Psycholinguistics. *Day*

Russian

- 185S. Introduction to Slavic Linguistics. *Andrews*
- 186S. History of the Russian Language. *Pugh*

Spanish

- 119S. Structure of Spanish. *Wheeler*
- 210. History of the Spanish Language. *Garci-Gómez*

Management Sciences (MS)

Professor Keller, *Chairman*; Professor Dickens, *Director of Undergraduate Studies*

The courses listed below are offered for undergraduates by the Fuqua School of Business. They are professional school courses and hence *do not count for the distributional requirements*. They fall within the limit of six professional school courses which may count for an undergraduate degree from Trinity College. A major is not offered to undergraduate students.

Taking a selection of these courses may be helpful in preparation for graduate education in business and law and may provide the liberal arts, science, and engineering student an advantage in placement. Students planning to take the accounting concentration in the Master of Business Administration Program of the Fuqua School of Business either following graduation or in the undergraduate-professional combination program should take Management Sciences 53 and 137 at a minimum.

The Director of Undergraduate Studies is available for consultation with undergraduates.

53. Introductory Financial Accounting. The accounting model of the firm and transactions analysis. Topics include the procedures used to process accounting data, issues in asset valuation and income determination, and financial statement analyses. Prerequisite: sophomore standing. One course. *Staff*

114. Decision Models. Development and use of models in the analysis of decision problems. Topics include linear programming and decision analysis; approaches to the solution of complex problems. Prerequisite: Mathematics 31. One course. *Staff*

120. Analysis of Organizational Behavior. Organizations and the behavior of individuals within organizations with emphasis on environmental, structural, and

human factors. Topics include socialization, work motivation, decision making, leadership, power, control, small group behavior, strategy formation, organization design, organizational culture, and effects of technology. Prerequisite: junior standing. One course. *Staff*

137. Managerial Accounting. The use of accounting information by management in short-term planning, control, and decision making in business enterprises. Cost accumulation, cost analysis, cost estimation, the development of standards, introduction to budgeting, and short-run decisions. Prerequisite: Management Sciences 53. One course. *Staff*

151. Investment Management. Problems of selecting a portfolio of investments emphasizing the economics of the markets and the tools of analysis. Prerequisites: Economics 138 or equivalent and junior standing. One course. *Staff*

154. Finance. Problems of financial management of the firm. Cash management, receivables management, short-term financial planning, cost of capital, capital budgeting, dividend policy, lease analysis, and long-term financial planning. Prerequisite: junior standing. One course. *Staff*

161. Marketing Management. The role of the marketing function in business; product planning, price, promotion, and distribution as elements of a total marketing mix. Formal models in solving the marketing mix problem of the firm. Prerequisite: junior standing. One course. *Staff*

171. Production and Operations Management. Issues in the design, operation, and control of the process by which goods are manufactured and services delivered. Topics include work-force management, production planning and materials management, capacity and technology choice, and the combination of operations choices into a coherent strategy. Prerequisite: junior standing. One course. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors with consent of instructor and Director of Undergraduate Studies. Credit to be arranged. *Staff*

199. Special Topics. Prerequisites: junior or senior standing and consent of instructor. One course. *Staff*

Marine Sciences—The University Program

Professor Costlow (zoology), *Director*; Associate Professor Ramus (botany), *Assistant Director for Academic Programs*; Associate Professor Forward (zoology), *Director of Undergraduate Student Affairs*; Professors Barber (botany and zoology), Gutknecht (physiology), Pilkey* (geology), and Searles† (botany); Associate Professors Johnson (geology), McClay† (zoology), Sullivan (biochemistry), and Sutherland (zoology); Professor Emeritus Bookhout (zoology); Assistant Medical Research Professors C. Bonaventura (biochemistry) and J. Bonaventura (biochemistry); Associate Research Professor Kirby-Smith (Marine Laboratory)

The interdisciplinary program in marine sciences provides juniors and seniors with a unique opportunity to live and study at the Duke University Marine Laboratory for a full academic semester—fall or spring or during the summer terms. The program emphasizes small class size, independent study, and integrated classroom, laboratory, and field experience. Students have daily access to modern scientific equipment, a specialized library, and the surrounding natural marine environment. Participation

*Spring only.

†Summer only.

in both the spring and fall semesters is possible for all majors with appropriate preparation.

In the fall and spring semesters students may choose from two curricular options. Option 1: the student enrolls in two courses (one of which is generally required as part of the program; one selected by the student); two seminars (a selection is generally available); and independent study. Option 2: as option 1, except the student does not enroll in independent study, but enrolls in three courses. Students are encouraged to choose the first option during either semester.

Duke University students wishing to apply to the fall semester or the spring semester must submit an application form, together with the written approval of their faculty adviser, to the Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516, prior to Duke's registration period for the desired semester. Students will be notified of the action of the admissions committee shortly thereafter. Applications received after Duke's registration period for the desired semester will be considered if space is available.

The summer curriculum, taught in three five-week terms, includes a rich assortment of courses in the natural sciences. Attention is directed to the relatively new introductory course in marine biology (Biology 10L), designed to fulfill the empirical natural science requirement for humanities or social sciences majors at Duke.

Applications for summer courses must be accompanied by a current academic transcript (in those cases where students are applying to courses numbered 100 or higher) and should be submitted by the end of March to the address indicated above. (Thereafter, applications will be considered if space is available.) Duke students must submit the written approval of their faculty adviser.

A number of summer tuition scholarships are available. Please consult the *Bulletin of Duke University: Marine Laboratory* for specific requirements and deadline dates, or contact the Admissions Office of the Marine Laboratory.

The following courses are described in the listings of the specified departments. See the *Bulletin of Duke University: Marine Laboratory* for the current schedule of courses.

SUMMER COURSES AT BEAUFORT

Marine Biology. (Biology 10L.) One course. Kirby-Smith

Introduction to Biological Oceanography. (Botany 114L or Zoology 114L.) One and one-half courses. Staff

Physiology of Marine Animals. (Zoology 150L/250L.) One course. Forward

Marine Invertebrate Zoology. (Zoology 176L.) One and one-half courses. Bookhout

Independent Study. (Botany 191, 192 or Zoology 191, 192.) Credits to be arranged. Staff

Marine Policy. (Public Policy Studies 195S.) One course. Orbach (visiting summer faculty)

Marine Ecology. (Zoology 203L.) One and one-half courses. Sutherland

Primary Productivity in the Seas. (Botany 215L or Zoology 215L.) One course. Barber and Ramus

Barrier Island Ecology. (Botany 218.) One and one-half courses. Leatherman (visiting summer faculty)

Benthic Marine Algae. (Botany 219L.) One course. Searles

Tropical Seaweeds. (Botany 263L.) Half course. Searles

Marine Invertebrate Zoology. (Zoology 274L.) One and one-half courses. *Barnes (visiting summer faculty)*

Comparative and Evolutionary Biochemistry. (Biochemistry 276L.) One and one-half courses. *Sullivan*

Invertebrate Developmental Biology. (Zoology 278L.) One and one-half courses. *McClay and visiting staff*

Behavior and Ecology of Fishes. (Zoology 295S.) One course. *Staff*

FALL COURSES AT BEAUFORT

Analysis of Marine Ecosystems. (Botany 167 or Zoology 167.) Prerequisites: introductory biology and chemistry. One course. *Barber*

Organization of Marine Communities. (Zoology 169L.) Students may not receive credit for both Zoology 103L and 169L. Prerequisites: introductory biology and Mathematics 31. One course. *Sutherland*

Independent Study. (Botany 191, Zoology 191, Biochemistry 209, or as listed under the student's major department.) For junior and senior majors with consent of Director of Undergraduate Studies and supervising instructor. One course. *Staff*

Light in the Sea. (Botany 195S.) Half course. *Ramus*

Membrane Physiology. (Physiology 219S.) Half course. *Gutknecht*

Macromolecules, Ecology, and Evolution. (Biochemistry 245L.) The structure and function of protein and nucleic acid molecules with particular emphasis on the application of molecular techniques to questions in ecological, systematic, and evolutionary theory. One course. *Sullivan*

Marine Animal Navigation. (Zoology 295S.) Half course. *Forward*

SPRING COURSES AT BEAUFORT

Introduction to Biological Oceanography. (Botany 114L or Zoology 114L.) Not open to students who have had Geology 53 or Botany 53. Prerequisite: introductory biology. One course. *Barber and Ramus*

Physiology of Marine Animals. (Zoology 150L.) Prerequisites: introductory biology and chemistry. One course. *Forward*

Independent Study. (Botany 192, Geology 192, Zoology 192, Biochemistry 210, or as listed under the student's major department.) For juniors and seniors with consent of Director of Undergraduate Studies and supervising instructor. One course. *Staff*

Beach and Island Geological Processes. (Geology 196S.) Half course. *Pilkey*

Physical Oceanography. (Geology 203.) Prerequisite: Physics 41 or 51. Half course. *Johnson*

Chemical Oceanography. (Geology 204.) Prerequisites: Chemistry 11 and Geology 203 (may be taken concurrently.) One course. *Staff*

Geological Oceanography. (Geology 205S.) One course. *Johnson*

Adaptations of Organisms to the Marine Environment. (Biochemistry 220S.) Half course. *C. Bonaventura or J. Bonaventura*

Marine Fishes: Selected Topics. (Zoology 296S.) Half course. *Forward and Sullivan*

Experimental Ecology of the Marine Intertidal Zone. (Zoology 296S.) Half course.
Sutherland

COURSES CURRENTLY UNSCHEDULED

Public Policy and the Marine Environment. (Interdisciplinary Course 104.)

Phytoplankton. (Botany 115L.)

Marine Biochemistry and Genetics. (Biochemistry 266S.)

Human Impact on Biogeochemical Cycles. (Botany 296S or Zoology 296S.)

Natural History of Coastal Marine Systems. (Botany 296S or Zoology 296S.)

Mathematics (MTH)

Professor Reed, *Chairman*; Associate Professor Kraines, *Director of Undergraduate Studies*; Associate Professor R. Hodel, *Supervisor of Freshman Instruction*; Professors Allard, Beale, DiPerna, Griffiths, Schaeffer, Shoenfield, Warner, and Weisfeld; Associate Professors Burdick, Kitchen, Moore, Pardon, Schonbek, Scoville, and Smith; Assistant Professors Cheney, Lawler, Miksis, Nance, Schoen, Shearer, and Sylvester; Professors Emeriti Carlitz, Dressel, Elliott, Hickson, Murray, and Roberts; Adjunct Professor Chandra; Visiting Professor Bryant; Instructors Appelbaum, Blake, and Bookman; Part-time Instructor M. Hodel; Lecturer Keshet

9-10. Preparatory and Precalculus Mathematics. A two-semester skills course for students who need to review topics in high school mathematics while covering the material in Mathematics 19. Students whose Mathematics SAT scores are 500 or below, or whose CEB Mathematics Level I or II Achievement Test scores are 480 or below, need this two-semester course before taking Mathematics 31. No credit for Mathematics 9 without successful completion of Mathematics 10. Not open to students who take Mathematics 19. Prerequisite for 10: Mathematics 9. One course. *Staff*

19. Precalculus Mathematics. Selected topics in algebra, trigonometry, and analytic geometry. Students with achievement scores in mathematics below 550 need this skills course before taking Mathematics 31. Not open to students who take Mathematics 10. Prerequisite: two units of college preparatory mathematics. One course. *Staff*

31. Introductory Calculus I. Functions, limits, continuity, trigonometric functions, techniques and applications of differentiation, indefinite and definite integrals, the fundamental theorem. One course. *Staff*

32. Introductory Calculus II. Transcendental functions, techniques and applications of integration, indeterminate forms, improper integrals, infinite series. Not open to students who have had Mathematics 36. Prerequisite: Mathematics 31 or 33. One course. *Staff*

31P, 32P. Preceptorial. Elective preceptorial for students enrolled in Mathematics 31 and 32. *Staff*

31X, 32X. Introductory Honors Calculus I and II. Similar to Mathematics 31 and 32, but faster paced and more challenging. Open to students who score at least 750 on the SAT Mathematics Aptitude Test. Two courses. *Staff*

33, 34. Introductory Calculus with Digital Computation. Same as 31, 32 but these courses meet one additional hour per week to discuss the solution of calculus problems using the computer. No programming experience required. Prerequisites for 34: Mathematics 33 or 31 and consent of instructor. Two courses. *Staff*

53. Basic Statistics. Statistical concepts involved in making inferences, decisions, and predictions from data. Techniques not emphasized. Not open to students who have had Economics 138, Political Science 138, Psychology 117, Public Policy Studies 112, or Sociology 133. One course. *Staff*

103. Intermediate Calculus. Partial differentiation, multiple integrals, topics in differential and integral vector calculus. Prerequisite: Mathematics 32 or 34. One course. *Staff*

103P. Preceptorial. Elective preceptorial for students enrolled in Mathematics 103 or 103X. *Staff*

104. Linear Algebra and Applications. Systems of linear equations and elementary row operations, Euclidean n -space and subspaces, linear transformations and matrix representations, Gram-Schmidt orthogonalization process, determinants, eigenvectors and eigenvalues; applications. Prerequisite: Mathematics 32 or 34. One course. *Staff*

104P. Preceptorial. Elective preceptorial for students enrolled in Mathematics 104 or 104X. *Staff*

103X, 104X. Honors Intermediate Calculus and Linear Algebra. Similar to Mathematics 103, 104, but more theoretical. Students who have taken 31X, 32X are encouraged to enroll. Students continuing from 103X should take 104X rather than 104. Two courses. *Staff*

105. Intermediate Calculus with Digital Computation. Same as 103, but this course meets one additional hour per week to discuss the solution of calculus problems using the computer. The course is a continuation of Mathematics 33, 34. Prerequisites: Mathematics 34 or 32 and the equivalent of Computer Science 51. One course. *Staff*

106. Linear Algebra with Digital Computation. Same as 104, but with additional applications of eigenvalues and eigenvectors. Packaged computer programs will be used extensively. No programming experience required. Prerequisite: Mathematics 103 or 105. One course. *Staff*

111. Applied Mathematical Analysis I. First and second order differential equations with applications; matrices, eigenvalues, and eigenvectors; linear systems of differential equations; Fourier series and applications to partial differential equations. Intended primarily for engineering and science students with emphasis on problem solving. Not open to students who have had Mathematics 131. Prerequisite: Mathematics 103. One course. *Staff*

114. Applied Mathematical Analysis II. Boundary value problems, complex variables, Cauchy's theorem, residues, Fourier transform, applications to partial differential equations. Not open to students who have had Mathematics 230. Prerequisites: Mathematics 111 or 131, and 103 and consent of instructor. One course. *Staff*

117. Introduction to Statistical Methods. Emphasis on the classical techniques of hypothesis testing and point and interval estimation, using the binomial, normal, t , F , and chi square distributions. Not open to students who have had Mathematics 136. Prerequisite: Mathematics 103 (may be taken concurrently) or consent of instructor. One course. *Staff*

123S. Geometry. Euclidean geometry, inversive and projective geometries, topology (Möbius strips, Klein bottle, projective space), and non-Euclidean geometries in two and three dimensions. Prerequisite: Mathematics 32 or 34, or consent of instructor. *Staff*

124. Combinatorics. Permutations and combinations, generating functions, recurrence relations; topics in enumeration theory, including the Principle of Inclusion-Exclusion and Polya Theory; topics in graph theory, including trees, circuits, and matrix representations; applications. Prerequisites: Mathematics 104 or 106 or consent of instructor. One course. *Staff*

126. Introduction to Linear Programming and Game Theory. Fundamental properties of linear programs; linear inequalities and convex sets; primal simplex method, duality; integer programming; two-person and matrix games. Prerequisites: Mathematics 32 or 34 and 103 and 104 or consent of instructor. One course. *Staff*

128. Number Theory. Divisibility properties of integers, prime numbers, congruences, quadratic reciprocity, number-theoretic functions, simple continued fractions, rational approximations. Prerequisite: Mathematics 32 or 34 or consent of instructor. One course. *Staff*

131. Elementary Differential Equations. Solution of differential equations of elementary types; formation and integration of equations arising in applications. Not open to students who have had Mathematics 111. Prerequisite: Mathematics 103; corequisite: Mathematics 104. One course. *Staff*

132S. Qualitative Theory of Ordinary Differential Equations. Qualitative behavior of general systems of ordinary differential equations, with application to biological and ecological systems, oscillations in biochemistry, electrical networks, and the theory of deterministic epidemics. Prerequisite: Mathematics 131 or 111 or consent of instructor. One course. *Staff*

135. Probability. Probability models, random variables with discrete and continuous distributions. Independence, joint distributions, conditional distributions. Expectations, functions of random variables, central limit theorem. Prerequisite: Mathematics 103. One course. *Staff*

136. Statistics. Sampling distributions, point and interval estimation, maximum likelihood estimators. Tests of hypotheses, the Neyman-Pearson theorem. Bayesian methods. Not open to students who have had Mathematics 117. Prerequisites: Mathematics 104 and 135. One course. *Staff*

139, 140. Advanced Calculus. The real number system, rigorous development of one-variable calculus, series and uniform convergence. Topics in multivariable calculus such as multiple integrals, differentiation of transformations, implicit function theorems, differential forms. Not open to students who have had Mathematics 203, 204. Prerequisite for 139: Mathematics 103; for 140: Mathematics 104 and 139. Two courses. *Staff*

140S. Advanced Calculus. Same as Mathematics 140, but offered as a seminar. One course. *Staff*

150. Topics in Mathematics from a Historical Perspective. Content of course determined by instructor. Prerequisite: Mathematics 139 or 203 or consent of instructor. One course. *Staff*

150S. Topics in Mathematics from a Historical Perspective. Same as Mathematics 150, but offered as a seminar. One course. *Staff*

160. Mathematical Numerical Analysis. Zeros of functions; polynomial interpolation and splines; numerical integration and differentiation; applications to ordinary differential equations; numerical linear algebra; error analysis; extrapolation and acceleration. Mathematics 160 or 221, but not both, may count toward the major requirements. Prerequisites: Mathematics 103 and 104 and knowledge of an algorithmic programming language; or consent of instructor. One course. *Staff*

160S. Mathematical Numerical Analysis. Same as Mathematics 160, but offered as a seminar. One course. *Staff*

171S. Elementary Topology. Introduction to graph theory, including the Königsberg bridge problem and four color problem; metric spaces and topological spaces; basic topological properties including compactness and connectedness; Brouwer fixed point theorem for $n = 2$, classification of compact, connected, 2-manifolds. Prerequisites: Mathematics 103 and 104. One course. *Staff*

187. Introduction to Mathematical Logic. Propositional calculus; predicate calculus. Gödel completeness theorem, applications to formal number theory, incompleteness theorem, additional topics in proof theory or computability. Prerequisites: Mathematics 103 and 104 or Philosophy 103. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Admission by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. Two courses. *Staff*

196S. Seminar in Mathematical Model Building. Real models, mathematical models, axiom systems as used in model building, deterministic and stochastic models, linear optimization, competition, graphs and networks, growth processes, evaluation of models. Term project: model of a nonmathematical problem. Prerequisites: Mathematics 103 and 104. One course. *Staff*

197S. Seminar in Mathematics. Intended primarily for juniors and seniors majoring in mathematics. Content of course determined by instructor. Prerequisites: Mathematics 103 and 104. One course. *Staff*

198S, 199S. Honors Seminar in Mathematics. Content of course determined by instructor. Prerequisite: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

For Seniors and Graduates

200. Introduction to Algebraic Structures I. Laws of composition, groups, rings; isomorphism theorems; axiomatic treatment of natural numbers; polynomial rings; division and Euclidean algorithms. Prerequisite: Mathematics 104 or equivalent. One course. *Staff*

201. Introduction to Algebraic Structures II. Vector spaces, matrices and linear transformations, fields, extensions of fields, construction of real numbers. Prerequisite: Mathematics 200 or equivalent. One course. *Staff*

203. Basic Analysis I. Topology of R^n , continuous functions, uniform convergence, compactness, infinite series, theory of differentiation, and integration. Not open to students who have had Mathematics 139. Prerequisite: Mathematics 104. One course. *Staff*

204. Basic Analysis II. Inverse and implicit function theorems, differential forms, integrals on surfaces, Stokes' theorem. Not open to students who have had Mathematics 140. Prerequisite: Mathematics 203. One course. *Staff*

205. Topology. Elementary topology, surfaces, covering spaces, Euler characteristic, fundamental group, homology theory, exact sequences. One course. *Staff*

206. Differential Geometry. Geometry of curves and surfaces, the Serret-Frenet frame of a space curve, the Gauss curvature, Cadazzi-Mainardi equations, the Gauss-Bonnet formula. Prerequisite: Mathematics 104. One course. *Staff*

221, 222. Numerical Analysis I, II. C-L: Computer Science 221, 222. Two courses. Douglas, Gallie, Patrick, Rose, or Utku

230. Mathematical Methods in Physics and Engineering I. Heat and wave equations, initial and boundary value problems, Fourier series, Fourier transforms, potential theory. Not open to students who have had Mathematics 114. Prerequisites: Mathematics 103 and 104 or equivalents. One course. Staff

231. Mathematical Methods in Physics and Engineering II. Green's functions, propagators, integral equations, spectral theory on Hilbert space, Fredholm alternative, variational methods. Prerequisite: Mathematics 114 or 230. One course. Staff

234. Mathematics for Quantum Mechanics. Hilbert space, self-adjoint operators, the mathematical model of quantum mechanics, commutation relations, spectral analysis of Hamiltonians, time dependent scattering theory. Prerequisites: Mathematics 230 and 231 or equivalents. One course. Staff

238, 239. Topics in Applied Mathematics. Conceptual basis of applied mathematics, combinatorics, graph theory, game theory, mathematical programming, or numerical solution of ordinary and partial differential equations. Prerequisites: Mathematics 103 and 104 or equivalents. Two courses. Staff

240. Applied Stochastic Processes. Applications of probability theory and stochastic processes to economics and environmental science. Markoff chains, optional stopping, queuing theory, decision theory, birth and death processes, and the Monte-Carlo method. Prerequisite: Mathematics 135 or equivalent. One course. Staff

241. Linear Models. Geometric interpretation, multiple regression, analysis of variance, experimental design, analysis of covariance. Prerequisite: Mathematics 136 or equivalent. One course. Staff

242. Multivariate Statistics. Multinormal distributions, multivariate general linear model, Hotellings T^2 statistic, Roy union-intersection principle, principal components, canonical analysis, factor analysis. Prerequisite: Mathematics 241 or equivalent. One course. Staff

248, 249. Topics in Statistics. Analysis of variance, design of experiments, non-parametric statistics, foundations of statistical inference. Prerequisite: consent of instructor. Two courses. Staff

250. Introductory Mathematical Logic. First-order logic, completeness theorem, compactness theorem, introduction to recursive functions, incompleteness theorem. Prerequisite: Mathematics 187 or 200 or equivalent. One course. Staff

251. Set Theory I. Zermelo-Fraenkel axioms, ordinals and cardinals, models of set theory, constructible sets. Prerequisite: Mathematics 187 or 200 or equivalent. One course. Staff

252. Set Theory II. Forcing, large cardinals, determinateness, and other advanced topics. Prerequisite: Mathematics 251. One course. Staff

258, 259. Topics in Logic. Model theory, recursion theory, set theory, or other fields of logic. Prerequisite: Mathematics 250 or equivalent. Two courses. Staff

260. Groups, Rings, Modules. Elementary categorical algebra, groups, rings, modules, linear and multilinear algebra. Prerequisite: Mathematics 201 or equivalent. One course. Staff

261. Commutative Algebra. Fields, Noetherian rings and modules. Dedekind domains. Prerequisite: Mathematics 260 or equivalent. One course. Staff

268, 269. Topics in Algebra. Algebraic number theory, algebraic K-theory, homological algebra, or topological algebra. Prerequisite: Mathematics 260. Two courses. *Staff*

271. Algebraic Topology. Fundamental group and covering spaces, homology groups of cell complexes, classification of compact surfaces, the cohomology ring and Poincaré duality for manifolds. Prerequisites: Mathematics 171S and 200 or equivalents. One course. *Staff*

280. Differential Analysis. Differential calculus, ordinary differential equations, flows, Lie bracket, total differential equations, first order partial differential equations, deRham theory. Prerequisite: Mathematics 140 or equivalent. One course. *Staff*

281. Real Analysis I. Measures; Lebesgue integral; L^p spaces; Daniell integral, differentiation theory, product measures. Prerequisite: Mathematics 140 or equivalent. One course. *Staff*

282. Real Analysis II. Metric spaces, fixed point theorems, Baire category theorem, Banach spaces, fundamental theorems of functional analysis, Fourier transform. Prerequisite: Mathematics 281 or equivalent. One course. *Staff*

284. Topics in Functional Analysis. Advanced spectral analysis, operator algebras, nonlinear functional analysis, or structure theory of Banach spaces. Prerequisite: Mathematics 282 or equivalent. One course. *Staff*

285. Complex Analysis. Complex calculus, conformal mapping, Riemann mapping theorem, Riemann surfaces. Prerequisite: Mathematics 140 or equivalent. One course. *Staff*

286. Topics in Complex Analysis. Geometric function theory, function algebras, several complex variables, uniformization, or analytic number theory. Prerequisite: Mathematics 285 or equivalent. One course. *Staff*

288, 289. Topics in Analysis. Harmonic analysis, dynamical systems, geometric measure theory, or calculus of variations. Prerequisites: Mathematics 281 and 285 or equivalents. Two courses. *Staff*

290. Probability. Random variables, independence, expectations, laws of large numbers, central limit theorem, Markoff chains. Prerequisite: Mathematics 281 or equivalent. One course. *Staff*

293, 294. Topics in Probability Theory. Basic areas of probability theory and its applications such as ergodic theory, multiparameter stochastic processes and random fields, stochastic control theory, or stochastic differential equations and others. Prerequisite: Mathematics 291 or equivalent. Two courses. *Staff*

298. Partial Differential Equations I. Fundamental solutions of linear partial differential equations, hyperbolic equations, characteristics; Cauchy-Kovalevskaya theorem; propagation of singularities. Prerequisite: Mathematics 297 or equivalent. One course. *Staff*

299. Partial Differential Equations II. Elliptic boundary value problems, regularity theorems, the diffusion equation, nonlinear equations. Prerequisite: Mathematics 298 or equivalent. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

36. Calculus for the Social Sciences

135P, 136P. Preceptorial

235. Topics in Mathematical Physics

278, 279. Topics in Topology

283. Linear Operators

297. Fourier Analysis and Distribution Theory

THE MAJOR

The Department of Mathematics publishes a handbook to guide majors in selecting courses for various areas of interest. A copy may be obtained from the Director of Undergraduate Studies.

For the A.B. Degree

Major Requirements. Six courses in mathematics numbered above 106, including either Mathematics 139 or Mathematics 203 and 204.

For the B.S. Degree

Major Requirements. Eight courses in mathematics numbered above 106, including (1) either Mathematics 139 or Mathematics 203, 204; and (2) one of the sequences 135, 136; 200, 201; 205, 206; 230, 231. Students must also meet an area of concentration requirement by (1) satisfying the major requirement of any discipline other than mathematics or by (2) completing a program of four mathematically related courses approved by the Director of Undergraduate Studies.

Honors

The department offers a program for graduation with distinction in mathematics. See the section on honors in this bulletin and also the *Handbook for Majors*.

School of Medicine—Basic Science Courses Open to Undergraduates

Qualified students in arts and sciences may select courses from the following offered by the graduate departments associated with the School of Medicine. A major is not offered to undergraduates in any of the departments listed below. For permission to register for these courses and for further information, see Professors Cartmill (anatomy), Siegel (biochemistry), Willett (microbiology and immunology), Bigner (pathology), or Associate Professor Padilla (physiology). The following 200-level courses are described in the *Bulletin of Duke University: Graduate School*.

Anatomy (ANA)

- 151. Anatomy of the Lower Extremities as It Relates to Locomotion. Prerequisite: written consent of instructor. One course. *Bassett*
- 166. Comparative Neurobiology. Prerequisite: consent of instructor. See C-L: Psychology 166; also C-L: Anatomy 266 and Psychology 266. One course. *Diamond and W.C. Hall*
- 191, 192, 193, 194. Independent Study. Open to qualified juniors and seniors with consent of instructor. No more than three of these may be taken for credit. Four courses. *Staff*
- 216S. Biological Psychology. C-L: Psychology 216S. One course. *Diamond*
- 217. Structure and Function of Visual Photoreceptors. Prerequisite: consent of instructor. Credit to be arranged; maximum one course. *Corless and McCaslin*
- 219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. One course. *Padilla and staff*
- 220. Developmental Biology. Prerequisite: a course in genetics or cell biology. One course. *Counce and Marchase*
- 246S. The Primate Fossil Record. Prerequisite: a course in human evolution. C-L: Anthropology 246S. One course. *Simons*
- 259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Biochemistry 259 and Microbiology and Immunology 259. One course. *Erickson and staff*

- 266. Comparative Neurobiology. Prerequisite: consent of instructor. See C-L: Psychology 166; also C-L: Anatomy 166 and Psychology 266. One course. *Diamond and W.C. Hall*
- 269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Botany 269, Microbiology and Immunology 269, and Zoology 269. One course. *McIntosh and staff*
- 286. Electron Microscopy and Related Techniques. Prerequisites: calculus and one year each of physics and general chemistry; or consent of instructor. One course. *Longley*

Courses Currently Unscheduled

- 219S. Seminar

Biochemistry (BCH)

- 209, 210. Independent Study. One or two courses. *Staff*
- 215. Genetic Mechanisms. Prerequisite: introductory biochemistry. C-L: Genetics—The University Program. One course. *Gross and staff*
- 219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. One course. *Padilla and staff*
- 220S. Adaptations of Organisms to the Marine Environment. C-L: Marine Sciences. (Given at Beaufort.) Half course. *C. Bonaventura or J. Bonaventura*
- 222. Structure of Biological Macromolecules. Half course. *Richardson*
- 227. Introductory Biochemistry I: Intermediary Metabolism. Prerequisite: organic chemistry. C-L: Botany 227. One course. *Fridovich and Rajagopalan*
- 228. Introductory Biochemistry II: Biological Macromolecules. Prerequisite: Biochemistry 227 or equivalent. C-L: Botany 228. One course. *Greenleaf and Webster*
- 245L. Macromolecules, Ecology, and Evolution. C-L: Marine Sciences. One course. *Sullivan*
- 259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259 and Microbiology and Immunology 259. One course. *Richardson and staff*
- 265S, 266S. Seminar. Topics and instructors announced each semester. Half course or variable. *Staff*
- 268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Botany 268 and Microbiology and Immunology 268. One course. *Modrich and staff*
- 276L. Comparative and Evolutionary Biochemistry. C-L: Marine Sciences. (Given at Beaufort.) One and one-half courses. *Sullivan*
- 291. Physical Biochemistry. Prerequisites: Chemistry 161 and 162 or equivalents. One course. *Hsieh and staff*
- 297. Intermediary Metabolism. One course. *Siegel and staff*
- 299. Nutrition. Half course. *Kamin*

Microbiology and Immunology (MIC)

- 103L. General Microbiology. Prerequisite: one course in a biological science or consent of instructor. C-L: Botany 103L. One course. *Johnson and Wheat*
- 209, 210. Independent Study. A laboratory or library project. Approval of Director of Undergraduate Studies and instructor required. Credit to be arranged. *Staff*
- 219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Pathology 219, and Physiology 230. One course. *Padilla and staff*
- 221. Medical Microbiology. Prerequisite: consent of instructor. One course. *Joklik and staff*
- 221L. Medical Microbiology. Prerequisite: consent of instructor. One and one-half courses. *Joklik and staff*
- 234. Introduction to Biostatistical Methods. Prerequisite: elementary mathematics including college algebra. One course. *Dawson*
- 236. Statistical Methods in Human Genetics. Prerequisite: introductory genetics. One course. *Dawson*
- 238. Intermediate Biostatistics and Data Analysis. Prerequisite: Microbiology 234 or equivalent. One course. *Dawson*
- 244. Principles of Immunology. Prerequisites: Zoology 160 and Chemistry 152 and consent of instructor. C-L: Zoology 244. One course. *Amos and McClay*
- 246S. Parasitic Diseases. Prerequisites: Microbiology 244 or 291, and Biochemistry 227 or equivalent. One course. *Balber*
- 259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259 and Biochemistry 259. One course. *Richardson and staff*
- 268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Microbiology 259 or consent of instructor. C-L: Biochemistry 268 and Botany 268. One course. *Modrich and staff*
- 269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, and Zoology 269. One course. *McClay and staff*

Pathology (PTH)

- All courses below require consent of instructor and Director of Graduate Studies.
- 210. Independent study. Prerequisite: senior standing. Credit to be arranged. *Staff*

- 219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Physiology 230. One course. *Padilla and staff*
- 258. Cellular and Subcellular Pathology. Half course. *Shelburne and Sommer*
- 275. Fundamentals of Electron Microscopy and Biological Microanalysis. One course. *Shelburne, Ingram, Brody, and Sommer*

Physiology (PHS)

- 200. Medical Physiology. Limited to students whose training requires knowledge of human physiology as it pertains to medicine. Four lectures, one conference, and one clinical correlation per week. Open to undergraduates only with consent of course leader. One course. *Padilla and staff*
- 204. Introduction to Modern Physiology. Prerequisites: Physiology 200 or equivalent and consent of instructor. One course. *Blum and staff*
- 208. Respiratory System in Health and Disease. Prerequisite: consent of instructor. Half course. *Salzano and Kylstra*
- 210. Individual Study. Prerequisites: senior standing and consent of Director of Undergraduate Studies. Credit to be arranged. *Staff*
- 217. Membrane Transport. Prerequisite: consent of instructor. One course. *Mandel and staff*
- 219S. Membrane Physiology. Half course. C-L: Marine Sciences. (Given at Beaufort.) *Gutknecht*
- 230. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Pathology 219. One course. *Padilla and staff*
- 260S. Interactions of Differentiated Cells. Half course. *Padilla and Jakoi*
- 272S. Physiology of the Central Nervous System. Prerequisites: Physiology 200 and 201 (or equivalents); and some knowledge of neuroanatomy; for undergraduates, consent of instructor. C-L: Psychology 272S. Half or one course. *Somjen and staff*

Courses Currently Unscheduled

- 203. Introduction to Biophysics and Biophysical Chemistry

Medieval and Renaissance Studies Program

Professor Tetel, *Director*; Assistant Professor Barnett-Robisheaux, *Director of Undergraduate Studies*

The Program in Medieval and Renaissance Studies is designed to provide the student with a well-rounded understanding of the historical, cultural, and social forces that shaped the medieval and Renaissance periods. The program is divided into four areas of study: fine arts (art and musicology); history; language and literature (English, French, German, Greek, Italian, Latin, and Spanish); and philosophy-religion. An interdisciplinary major is offered. See the section on the major below.

The courses listed below are among those now available in the program, and they are described under the listings of the specified departments.

Art and Art History

- 128. The Age of Justinian. *Staff*
- 132. Romanesque Art. *Bruzelius*
- 133. Gothic Art. *Bruzelius*
- 134. Medieval Architecture. *Bruzelius*
- 135. Gothic Cathedrals. *Bruzelius*
- 136. Gothic Cathedrals. Taught in French. *Bruzelius*
- 140. Giotto and the Origins of the Renaissance. *Goffen*
- 141. Fifteenth-Century Italian Art. *Goffen or Spencer*
- 142. Sixteenth-Century Italian Art. *Goffen or Spencer*
- 147. Venetian Art: Fifteenth Century to the Eighteenth Century. *Goffen*
- 148. Art of Northern Europe in the Fifteenth and Sixteenth Centuries. *Melion*
- 149. Death in Art. *Goffen*
- 150. Prints in the Fifteenth, Sixteenth, and Seventeenth Centuries. *Melion*
- 230S. Medieval and Byzantine Art and Architecture. *Staff*
- 232S. Romanesque and Gothic Art and Architecture. *Bruzelius*
- 240. Italian Art. *Goffen or Spencer*
- 242S. Studies in Italian Renaissance Art. *Goffen or Spencer*

Classical Studies

- 117. Ancient Mythographers. *Newton*

English

- 121. Medieval English Literature to 1500. *Nygard*
- 122. Sixteenth-Century English Literature. *DeNeef*

- 123. English Literature: 1600 to 1660. *DeNeef or Randall*
- 141. Chaucer. *DeNeef or Nygard*
- 143, 144. Shakespeare. *DeNeef, Jones, Porter, or G. Williams*
- 145. Milton. *DeNeef or Price*
- 182. Western Drama, Classical to Neoclassical. *Clum and Sandler*
- 208. History of the English Language. *Butters or Nygard*
- 212. Middle English Literature: 1100 to 1500. *Nygard*
- 221. Renaissance Prose and Poetry: 1500 to 1660. *DeNeef, Randall, or G. Williams*
- 225. Renaissance Drama: 1500 to 1642. *Randall or G. Williams*

French

- 145S. Topics in Renaissance Literature and Culture. *Tetel*
- 146S. Montaigne and Self-Portraiture. *Tetel*
- 148. French Drama of the Seventeenth Century. *Staff*
- 211. History of the French Language. *Hull*
- 248. French Literature of the Seventeenth Century. *Staff*

German

- 205, 206. Middle High German. *Westphal-Wihl*
- 215S. Seventeenth-Century Literature. *Borchardt*
- 216. History of the German Language. *Westphal-Wihl*
- 217S. Renaissance and Reformation Literature. *Borchardt*

History

- 104. The Intellectual Life of Europe, 1250-1600. *Barnett-Robisheaux or Witt*
- 105. Political and Constitutional History of England. *Herrup*
- 117. Early Modern Europe. *Barnett-Robisheaux or Neuschel*
- 133. Medieval Europe, A.D. 300-1400. *Young*
- 134. Medieval England. *Young*
- 138. Renaissance and Reformation Germany. *Barnett-Robisheaux*
- 173. History of Spain from Late Medieval Times to Present. *TePaske*
- 174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
- 195S.01-196S.01. Renaissance Intellectual History, 1300 to 1600. *Witt*
- 195S.13-196S.13. Elizabethan England. *Herrup*
- 195S.20. Comparative Problems in Early Modern European History. *Barnett-Robisheaux or Neuschel*
- 195S.28. The Black Death and the Crisis of Late Medieval Europe. *Barnett-Robisheaux*
- 221. Problems in the Economic and Social History of Europe, 1200-1700. *Witt*
- 222. Problems in the Intellectual History of the European Renaissance and Reformation. *Witt*
- 237S. Europe in the Early Middle Ages. *Young*
- 238S. Europe in the High Middle Ages. *Young*
- 267S-268S. From Medieval to Early Modern England. *Staff*

Interdisciplinary Courses

- 21S. Freshman Seminar: Topics in Medieval Studies. *Staff*
- 22S. Freshman Seminar: Topics in Renaissance Studies. *Staff*
- 160S. Topics in Medieval and Renaissance Studies. *Staff*

Italian

- 183. Readings in Italian Literature. *Caserta*
- 284, 285. Dante. *Caserta*

Latin

- 87, 88. Sight Reading in Classical, Medieval, and Renaissance Latin. *Staff*
- 221. Medieval Latin. *Newton*

Music

- 155S. Music History I: Antiquity, Middle Ages, Early Renaissance. *Seebass*
- 156S. Music History II: Late Renaissance, Baroque. *Bartlet or Seebass*
- 211. Medieval Notation. *Staff*
- 212. Renaissance Notation. *Staff*
- 221. Music in the Middle Ages: Monophony. *Seebass*
- 222. Music in the Middle Ages: Polyphony. *Seebass*
- 223. Music in the Renaissance. *Staff*

Philosophy

- 119. Medieval Philosophy. *Mahoney*
- 120. Late Medieval and Renaissance Philosophy. *Mahoney*
- 218S. Medieval Philosophy. *Mahoney*

Religion

- 134. Jewish Mysticism. *Bland*
- 135. Jewish Religious Thought. *Bland*
- 162. Introduction to Islamic Civilization. *Lawrence and staff*

Spanish

- 108S. Spanish Traditional Poetry. *Garci-Gómez*
- 151. Spanish Literature of the Renaissance and the Baroque. *Ross or Wardropper*
- 153. Golden Age Literature: Cervantes. *Staff*
- 210. History of the Spanish Language. *Garci-Gómez*
- 251. The Origins of Spanish Prose Fiction. *Wardropper*
- 253. Cervantes. *Wardropper*
- 254. Drama of the Golden Age. *Wardropper*
- 258S. Spanish Lyric Poetry before 1700. *Wardropper*

THE MAJOR

A major consists of at least eight courses drawn from the nonintroductory courses of the four areas of study (fine arts, history, language and literature, and philosophy-religion). Three courses in each of two areas must be included. Besides the courses specifically listed (under departmental and Interdisciplinary Course headings) in the medieval and Renaissance periods, provision may be made for independent study in any of the four areas.

Each program is tailored to the needs and interests of the student under the supervision of a committee consisting of faculty members from appropriate departments. After discussion with the Director of Undergraduate Studies for Medieval and Renaissance Studies, the student submits a provisional program of study outlining special interdisciplinary interests. Normally the program is planned well before the end of the sophomore year to allow time to acquire a working knowledge of languages pertinent to specific interests.

Military Science—Army ROTC (MSC)

Professor Lockey, Lieutenant Colonel, U.S. Army, *Chairman*; Assistant Professor Modica, Major, U.S. Army, *Director of Undergraduate Studies*; Assistant Professor Sebes, Major, U.S. Army

The Department of Military Science offers students from all disciplines within the University the opportunity to study the theory and practical application of skills in leadership, military law, communications, land navigation, and tactics. Non-ROTC students may take courses without incurring an obligation to the Army.

The Army ROTC program is made up of a two-year basic course of study (freshman and sophomore level) which is taken without obligation and a two-year advanced course of study (junior and senior level) which includes six weeks of advanced summer camp, usually completed immediately prior to the senior year. Direct entry into the advanced course is permitted for students who have previous military training or experience, or who complete a six-week basic summer camp at Fort Knox, Kentucky. To be eligible for participation in the advanced course, students must successfully complete the basic course (unless direct entry is permitted), be physically qualified, be of good moral character, have a minimum of two years remaining as a full-time student (undergraduate or graduate level), and sign a contract to accept a commission in the Army, Army National Guard, or the Army Reserve.

Laboratory is mandatory each semester for scholarship cadets and other students in their second semester or more of ROTC. Some laboratories may be required for non-ROTC students taking Military Science 51 or 52. Students should consult the instructor for further information.

1L. Fall Semester Laboratory. Drill and ceremonies, marksmanship training, land navigation exercises, and confidence course training. Mandatory for all Army ROTC students in Military Science 11, 51, 103, 113, and 151. Must be repeated with each course. No credit. *Staff*

2L. Spring Semester Laboratory. Drill and ceremonies, first aid, communications, and tactics exercises. Mandatory for all ROTC students in Military Science 12, 52, 104, 114, and 152. Must be repeated with each course. No credit. *Staff*

11. Introduction to ROTC and the Army. The military organization with emphasis on tradition, doctrine, and contribution to national objectives. Laboratory required for ROTC students only. Half course. *Modica*

12. The Military Profession. Introduction to the concept of the military as a profession. Questions of ethics and values in the military; the issue of war and morality. Laboratory required for ROTC students only. Half course. *Modica*

51. Military Topography. Interpretation and use of topographical maps to facilitate land navigation. Consideration of military significance of terrain. Laboratory required for ROTC students only. Half course. *Sebes*

52. Introduction to Small Unit Tactics. Introduction to planning, organizing, and conducting small unit offensive and defensive operations. Consideration of the principles of war. Laboratory required for ROTC students only. Half course. *Sebes*

103. Applied Military Leadership. Basic elements of military operations to include advanced topography and land navigation, military graphics, all-purpose unit defense, and military communications. Laboratory required for ROTC students. Not open to students who have taken Military Science 113. One course. *Staff*

104. Advanced Tactical Theory and Techniques. Introduction to threat forces' tactical doctrine and equipment. Conduct of mounted and dismounted tactical operations and employment of supporting assets. Laboratory required for ROTC students. Not open to students who have taken Military Science 114. One course. *Staff*

113. Advanced Military Operations. Fundamentals for the conduct of military operations including advanced military topography, unit movements, route reconnaissance, nuclear, biological, and chemical defense, and military communications. Laboratory required for ROTC students. Prerequisite: Military Science 51. Not open to students who have taken Military Science 103. One course. *Staff*

114. Advanced Tactical Applications. Study of the Soviet Army to include doctrine, organization, equipment, and training. Conduct of platoon offense, defense, and patrol operations for mechanized infantry and armor units. Laboratory required for ROTC students. Prerequisite: Military Science 52. Not open to students who have taken Military Science 104. One course. *Staff*

151. Military Justice and the Law of War. Introduction to the Uniform Code of Military Justice and its relation to the American legal system. Theory and practice of the Law of War as embodied in the Geneva, Hague, and other agreements. Laboratory required for ROTC students. One course. *Lockey*

152. Leadership and Command Management. Theory and practice of leadership and military management techniques for mission accomplishment. Laboratory required for ROTC students. One course. *Lockey*

191. Independent Study. Directed readings and research in military science. One course. *Staff*

Music (MUS)

Professor Douglass, *Chairman*; Assistant Professor Henry, *Director of Undergraduate Studies*; Professors Bone, Bryan, Hanks, and Withers; Associate Professors Seebass and Todd; Assistant Professors Agawu, Bartlet, and Jaffe; Visiting Professor Ward; Artists-in-Residence Berg, Ciompi, Jeffrey, Muti, and Wynkoop; Instructor Higgins; Lecturer Love; Artist Associates Bloom, Raimi, and Taylor; Staff Associates Arcus, Cabbage, Gilmore, Gress, Hawkins, Johnston, Ketch, Lail, Mizesko, Peck, Pederson, Rossman, Ruggero, Troxler, and Weddle; Librarian Hammond

THEORY AND COMPOSITION

36. Acoustics and Music. Physical principles underlying musical instruments, room acoustics, and the human ear. Analysis, reproduction, and synthesis of musical sounds. No previous knowledge of physics is necessary. C-L: Physics 36. One course. *Lawson*

55. Introduction to Music Theory. Fundamentals of notation, melodic and harmonic practice, analysis, and score reading, as a basis for independent work. Prerequisite: some ability to read music. Does not count for major requirements. One course. *Troxler*

65. Fundamentals of Music Theory. Physical properties of sound, principles of diatonic tonal organization, melodic and harmonic constructions, elementary counterpoint, and figured bass. Prerequisite: basic knowledge of musical notation and vocabulary. One course. *Agawu, Jaffe, Todd, or Wynkoop*

66. Tonal Harmony. Harmonic language of eighteenth and nineteenth centuries, functional chromaticism, and introduction to musical forms. Prerequisite: Music 65. One course. *Agawu, Jaffe, Todd, or Wynkoop*

67S, 68S. Composition I. Composing original music in smaller forms for voice, piano, and other instruments. Studies in compositional techniques. Prerequisites: Music 65 and 66 or consent of instructor. Two courses. *Jaffe or Ward*

115S. Modal Counterpoint. Polyphonic practice of the fifteenth and sixteenth centuries; sacred and secular music. Prerequisite: Music 66 or consent of instructor. One course. *Staff*

116S. Tonal Counterpoint. Polyphonic practice of the seventeenth, eighteenth, and nineteenth centuries; sacred and secular music. Prerequisite: Music 115S or consent of instructor. One course. *Staff*

122. Orchestration. Characteristics and transpositions of the instruments. Scoring for symphony orchestra; concert band; and string, woodwind, brass, and percussion ensembles from pre-existing piano scores, or the student's original compositions. Prerequisite: Music 116S. One course. *Bryan or Jaffe*

129. Choral Conducting. Development of techniques of conducting vocal repertoire, ranging from church anthems to large-scale works. Score-reading and analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 116S or consent of instructor. One course. *Wynkoop*

130T, 131T. Performance Practice (Organ) I, II. Analytical and practical study of organ compositions from various epochs. Registration, fingering, pedaling, ornamentation, touch, and *notes inégales* as described in ancient theoretical treatises and comments of composers. Paper and performances required. Prerequisites for 130T: one year of organ instruction at Duke or the equivalent and consent of instructor; for 131T: Music 130T. Two courses. *Douglass*

132T, 133T. Performance Practice (Organ) III, IV. Prerequisite for 132T: Music 131T; for 133T: Music 132T. Two courses. *Douglass*

HISTORY, LITERATURE, AND MUSICOLOGY

74. Introduction to Jazz. A survey examining musical, aesthetic, sociological, and historical aspects. For nonmajors. C-L: Afro-American Studies 74 and Canadian Studies. One course. *Jeffrey*

119. The Humanities and Music. A historical survey of the relationship of significant literary texts to music, exemplifying literary genres and concepts with musical works from antiquity to the nineteenth century. Readings from primary literary sources, listening to representative musical settings. Does not count for the major in music. One course. *Bartlet or Seebass*

125. Masterworks of Music. Historical, biographical, and analytical study of works by major composers of the seventeenth through the twentieth centuries. C-L: Comparative Area Studies. One course. *Staff*

127S. Symphonic Literature. A survey of symphonies and concertos from Haydn to Mahler designed to define the Classical and Romantic symphonic heritage. Prerequisite: Music 125 or consent of instructor. One course. *Bone*

136. Introduction to Non-Western Music. Study of social and religious contexts. Native instruments and related craftsmanship. C-L: Comparative Area Studies. One course. *Seebass*

137. Music in South Asia. An introduction to the music and musical culture of India, Pakistan, and Bangladesh. Basic principles of theory and performance and social, religious, and historical contexts. C-L: Comparative Area Studies. One course. *Seebass and Silver*

139. Twentieth-Century Music. Influential creative stylistic developments in music of the present century. A critical survey of works by Bartok, Berg, Schonberg, Stravinsky, and Webern as a means of establishing a relative standard of values for subsequent independent exploration. Prerequisite: a one-year course in music theory or literature, or consent of instructor. One course. *Jaffe or Todd*

155S. Music History I: Antiquity, Middle Ages, Early Renaissance. Prerequisite for music majors: Music 65 or consent of instructor; for nonmajors: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Seebass*

156S. Music History II: Late Renaissance, Baroque. Prerequisite for music majors: Music 65 or consent of instructor; for nonmajors: consent of instructor. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Bartlet or Seebass*

157S. Music History III: Rococo and Classic. Prerequisite for music majors: Music 65 or consent of instructor; for nonmajors: consent of instructor. C-L: Comparative Area Studies. One course. *Bryan or Seebass*

158S. Music History IV: Romanticism to the Early Modern Period. Prerequisite for music majors: Music 65 or consent of instructor; for nonmajors: consent of instructor. C-L: Comparative Area Studies. One course. *Todd*

160. History of the Organ and Its Literature. Historical survey of the organ from about 1450 to 1950, emphasizing development of the major national styles of building and composition; historical roots of the Flentrop organ. Prerequisite: one course in music theory or literature or consent of instructor. One course. *Douglass*

170. Romanticism in the Arts. C-L: Interdisciplinary Course 170. One course. *Applewhite, B. Ward, or R. Ward*

For Advanced Undergraduates and Graduates

201. Introduction to Musicology. Introduction to and assessment of reference materials, other bibliographic tools, and research methods for the field of musicology. Prerequisite: consent of instructor. One course. *Staff*

211. Medieval Notation. Introduction to codicology and paleography; notation of plain chant and of polyphony through the fourteenth century. C-L: Medieval and Renaissance Studies. One course. *Staff*

212. Renaissance Notation. Mannered notation; fifteenth-century white notation; proportions; instrumental scores, partituras, and tablatures. Prerequisite: Music 211 or consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Staff*

213. Theories and Notation of Contemporary Music. Selected topics. One course. *Jaffe or Ward*

215, 216. Problems in Music Analysis. Selected topics. Two courses. *Agawu*

221. Music in the Middle Ages: Monophony. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Seebass*

222. Music in the Middle Ages: Polyphony. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Seebass*

223. Music in the Renaissance. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Staff*

224. Music in the Baroque Era. Selected topics. One course. *Douglass or staff*

225. Music in the Classic Era. Selected topics. One course. *Staff*

226. Music in the Romantic Era. Selected topics. One course. *Todd*

227. Music in the Postromantic and Modern Eras. Selected topics. One course. *Todd*

296S. Analysis of Recent Contemporary Music. Selected topics. One course. *Jaffe or Ward*

297, 298, 299. Composition. Selected topics. One course each. *Jaffe or Ward*

INDEPENDENT STUDY AND SEMINARS

Admission to these courses will be subject to the approval of the Director of Undergraduate Studies and the instructor. The instructor and course content will be established in accordance with the individual student's interests and capacities.

179, 180. Independent Study in Musical Performance.* Open only to sophomores possessing an exceptional technical and interpretive command of a musical medium. Prerequisites: previous registration in private instruction in applied music at Duke, audition, and consent of instructor. Two courses. *Staff*

181, 182. Independent Study in Musical Performance.* Same as 179, 180, but for juniors. Two courses. *Staff*

183, 184. Independent Study in Musical Performance.* Same as 179, 180, but for seniors. Two courses. *Staff*

191, 192. Independent Study. Directed reading, research, and musical analysis within a prescribed area of musical literature. Open only to qualified students in the junior year by consent of the department. One or two courses. *Staff*

*The schedule of fees for private lessons, as published in the subsection on fees, is applicable to courses 179, 180, 181, 182, 183, 184.

193, 194. Independent Study. Same as 191, 192, but for seniors. One or two courses. *Staff*

APPLIED MUSIC

The study of applied music promotes the understanding of music literature through performance. A limited number of students may receive private instruction in instruments and voice for Duke University credit, providing they qualify by audition. Prior to registration students must arrange an audition, either in person or by tape recording, with the instructor. For those students who wish to study privately but do not qualify for university level instruction, a list of music teachers in the immediate area who are available to Duke students can be obtained from the music department office. Class instruction is offered in small and large ensembles. All courses may be repeated for credit. Not more than two ensembles may be taken concurrently for credit.

57S, 58S, 59S, 60S. Vocal Diction. Problems of diction for the singer. Study of standard pronunciation with special emphasis on phonetics in Italian, English, German, and French. Four half courses. *Hanks*

Instruction: half hour, quarter course credit

- 79. Class Voice. *Lail*
- 80. Piano. *Hawkins, Love, Ruggero, or Withers*
- 81. Strings. *Berg, Bloom, Cabbage, Taylor, or Raimi*
- 82. Woodwinds. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*
- 83. Brass. *Bryan, Gress, Ketch, or Mizesko*
- 84. Percussion. *Staff*
- 85. Voice. *Hanks, Lail, or Peck*
- 86. Organ. *Arcus or Douglass*
- 87. Harpsicord. *Arcus*

Instruction: 1 hour, half course credit

- 90. Piano. *Hawkins, Love, Ruggero, or Withers*
- 91. Strings. *Berg, Bloom, Cabbage, Taylor, or Raimi*
- 92. Woodwinds. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*
- 93. Brass. *Bryan, Gress, Ketch, or Mizesko*
- 94. Percussion. *Staff*
- 95. Voice. *Hanks, Lail, or Peck*
- 96. Organ. *Arcus or Douglass*
- 97. Harpsicord. *Arcus*

Ensemble Classes: quarter course credit; pass/fail

- 100. Symphony Orchestra. *Muti*
- 101. Wind Symphony. *Bryan*
- 102. Marching Band. *Henry*
- 103. Jazz Ensemble. *Jeffrey*
- 106. Chamber Music. *Staff*
- 110. Collegium Musicum. *Johnston*
- 111. Opera Workshop. *Hanks*
- 113. Chorale. *Wynkoop*

Credit in Applied Music. (Skills courses—credit not applicable to distributional requirements.)* Credit for instruction in courses below 100 is granted on the basis of a half course per semester for one hour of private instruction per week and a minimum of six hours practice weekly; or a half course per year for one half hour of private instruction or one period of class study and a minimum of six hours practice per week. An additional weekly class meeting for performance and criticism may be required by the instructor without additional credit. Credit for instruction in courses above 99

*Subject to instructor's approval, a student at an advanced level in applied music may take courses for tutorial and distributional requirements. These courses shall be designated by adding a T to the appropriate course number. Students who have not reached an advanced level will continue to take the regular applied music courses.

is granted on the basis of a half course per year for one rehearsal period of instruction and a minimum of three hours practice per week. In the summer terms, credit is awarded on the basis of a comparable amount of time in instruction and practice time.

Fees. Applied music instruction in one medium (instrument or voice) is offered free to music majors (declared first majors). Additional instruction for music majors and all instruction for nonmajors will be charged as follows:

One half-hour private lesson per week for one semester	\$100
One one-hour private lesson per week for one semester	\$200
One half-hour class lesson per week for one semester	\$60
Registration in ensemble classes (Music 100-104, 110-113)	Free

No charge is made for practice room facilities for students registered for private or class lessons in applied music. A fee schedule for the use of facilities by others not registered for applied lessons is available from the music department office.

Fees are not refundable after the final drop/add day.

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

128. Instrumental Conducting

138. The Music of Southeast Asia

142. The Musical Theater

143. Beethoven and His Time

165. Opera in Vienna

185S, 186S. Seminars in Music

THE MAJOR

Prerequisites. Music 65, 66, and one year of applied music study in instrument or voice. Any or all of these may be exempted through demonstration of proficiency by examination and/or audition.

Major Requirements. Music 115S, 116S, 155S, 156S, 157S, 158S, and one additional elective course in the department. Those who plan to study music beyond the undergraduate level are strongly advised to prepare themselves in two or more foreign languages.

Honors. Majors who are qualified (see the section on honors in this bulletin) may undertake work leading to graduation with distinction in music by application to the Director of Undergraduate Studies. Honors work usually involves participation in an appropriate senior seminar and/or independent study. It must culminate in a paper, historical or analytical, either full length by itself or somewhat more concise if offered in conjunction with a recital or composition. The paper must be approved by a faculty committee.

Naval Science—Navy ROTC (NS)

Professor Green, Captain, U.S. Navy, *Chairman*; Associate Professor Kay, Commander, U.S. Navy, *Director of Undergraduate Studies*; Assistant Professors Mason, Lieutenant, U.S. Navy, and Schwenke, Captain, U.S. Marine Corps

Courses in naval science are open to all students. The program in Naval Science offers students an opportunity to gain technical knowledge in naval systems, leadership and management skills, and a pathway to a challenging career as a naval officer.

Since a major is not available in this program, scholarship program participants are encouraged to pursue majors in engineering or specific science fields, although a major in any field of study leading to a baccalaureate degree meets the basic requirement. The academic program for an approved degree and commission must include all naval science courses, laboratories, and seminars. Scholarship students must complete one year of calculus by the end of the sophomore year, one year of calculus-based physics by the end of the junior year, one semester of military history, one year of English, one semester in a modern foreign language, and certain technical electives. College program students are encouraged, but not required, to take calculus and physics. Marine Corps students may substitute management and political science courses for the calculus and physics requirements.

11L. Naval Orientation. Military formations, movements, commands, courtesies and honors, and elements of unit leadership. *Staff*

12. Naval Ships Systems. Structure, elements of design, stability, compartmentation, communications, and propulsion systems as they bear on safe operation and combat or service effectiveness. One course. *Staff*

12L. Naval Ships Systems Laboratory. Practical application of the theories and principles of naval ships systems. *Staff*

51L, 52L. Seapower and Maritime Affairs Seminar. Contemporary studies in seapower, including an examination of the rise and current status of the Soviet Navy. *Schwenke*

126. Concepts and Analyses of Naval Tactical Systems. Detection systems; systems integration into current naval platforms and their offensive and defensive capabilities. One course. *Staff*

131. Navigation. Theory, principles, and procedures of ship navigation, movements, and employment. Dead reckoning, piloting, and electronic principles of navigation. Naval Science 131L should be taken concurrently. One course. *Mason*

131L. Navigation Laboratory. Practical application of the theories and principles of navigation as presented in the lecture series. *Mason*

132. Naval Operations. Components of general naval operations, including concepts and application of tactical formations and dispositions, relative motion, maneuvering board and tactical plots, rules of the road, and naval communications. Naval Science 132L is a concurrent requirement. One course. *Mason*

132L. Naval Operations Laboratory. Practical application of the theories of naval operations as presented in the lecture series. *Mason*

141. Evolution of Warfare. Continuity and change in the history of warfare, with attention to the interrelationships of social, political, technological, and military factors. One course. *Schwenke*

145L. Naval Organization and Management Laboratory. Lines of command and control; organization for logistics, service, and support; research on the practical application of fundamental leadership principles. *Staff*

146L. Naval Ship Administration Laboratory. Concepts and applications of naval justice, shipboard administration, and training. *Staff*

151. Amphibious Operations. Development of amphibious doctrine, with attention to its current applications. One course. *Schwenke*

Philosophy (PHL)

Professor Golding, *Chairman*; Associate Professor Brandon, *Director of Undergraduate Studies*; Professors Mahoney, Peach, and Sanford; Associate Professors Posy and Rob-

erts; Assistant Professors Ferejohn and Jackson; Professor Emeritus Welsh; Adjunct Associate Professor Ward

The undergraduate program in the Department of Philosophy acquaints students with the content and the structure of philosophical theory in various areas. Discussion is encouraged so that students can engage actively in the philosophical examination of problems.

Course offerings fall into two general categories: the systematic and the historical. In a systematic treatment, the organization of a course is primarily in terms of the problems presented by the subject matter of that course, as in logic, ethics, and metaphysics. In historical courses, attention is directed more to the order of development in the thought of a particular philosopher (Plato, Aristotle, Kant) or in a historical period. In all courses, reading of the works of philosophers acquaints the students with the important and influential contributions to the definition and solution of philosophical issues.

The problems raised in philosophy in respect to the various fields of the arts and sciences involve questions which are not normally given attention in those particular disciplines. In the consideration of such problems, therefore, it is expected that students will acquire some understanding and perspective of the major areas of the human intellectual endeavor. In this sense, philosophical comprehension is an essential part of a student's learning and education.

Philosophy provides a sound preparation for the demands of many professions. For example, the precision of argument and broad acquaintance with intellectual traditions emphasized in philosophy form an excellent basis for the study of law.

Only one course from among Philosophy 41, 42, 43S, and 44S may be taken for credit. These courses are not open to juniors and seniors.

41. Introduction to Philosophy. Examination of problems in philosophy; emphasis on metaphysics and theory of knowledge. One course. *Staff*

42. Introduction to Philosophy. Examination of problems in philosophy; emphasis on ethics and value theory. One course. *Staff*

43S. Introduction to Philosophy. Philosophy 41 conducted as a seminar. One course. *Staff*

44S. Introduction to Philosophy. Philosophy 42 conducted as a seminar. One course. *Staff*

48. Logic. The conditions of effective thinking and clear communication. Examination of the basic principles of deductive reasoning. One course. *Brandon, Posy, Sanford, or Welsh*

93. History of Ancient Philosophy. The pre-Socratics, Socrates, Plato, Aristotle, and post-Aristotelian systems. Prerequisites for freshmen: previous philosophy course and consent of instructor. One course. *Ferejohn or Mahoney*

94. History of Modern Philosophy. Bacon, Hobbes, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Prerequisites for freshmen: previous philosophy course and consent of instructor. One course. *Peach or Posy*

101. Philosophy of Religion. Selected concepts and doctrines. One course. *Roberts*

102. Aesthetics: The Philosophy of Art. The concept of beauty, the work of art, the function of art, art and society, the analysis of a work of art, criticism in the arts. One course. *Staff*

103. Symbolic Logic. Detailed analysis of deduction and of deductive systems. Open to sophomores by consent of instructor. C-L: Linguistics. One course. *Brandon or Posy*

104. Philosophy of Science. The principal philosophical and methodological problems in contemporary science. One course. *Brandon*

106. Philosophy of Law. Natural law theory, legal positivism, legal realism, the relation of law and morality. One course. *Golding*

107. Political and Social Philosophy. The fundamental principles of political and social organizations. One course. *Mahoney*

109. Philosophy of Language. A philosophical analysis of problems arising in the study of language and symbolism. Topics include: theories of language, the nature of signs and symbols, theories of meaning, types of discourse (scientific, mathematical, poetic), definition, ambiguity, metaphor. C-L: Linguistics. One course. *Posy*

110. Knowledge and Certainty. Problems in the theory of knowledge: conditions of knowledge, scepticism, perception, memory, induction, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*

111. Appearance and Reality. Problems in metaphysics: theories of existence, substance, universals, identity, space, time, causality, determinism and action, and the relation of mind and body. One course. *Sanford*

113. Philosophy of Mathematics. Survey of mathematical thought including the nature of infinity, Platonism, constructivism, and the foundational crisis of the early twentieth century. Prerequisite: one course in calculus or logic or philosophy; or consent of instructor. One course. *Posy*

116. Systematic Ethics. Problems in moral philosophy: the nature of morality, ethical relativism, egoism, utilitarianism. Both historical and contemporary readings, with emphasis on the latter. One course. *Golding or Jackson*

117. Ancient and Modern Ethical Theories. The development of ethical thought in the West; the interaction between culture and ethical theory, with special reference to the Greek city-state, Roman law, the Renaissance, the Reformation, and the rise of modern science. Readings in the great ethical philosophers. One course. *Jackson*

118. Philosophical Issues in Medical Ethics. Ethical issues arising in connection with medical practice and research and medical technology. Definition of health and illness; experimentation and consent; genetic counseling and biological engineering; abortion, contraception, and sterilization; death and dying; codes of professional conduct; and the allocation of scarce medical resources. Prerequisites for freshmen: previous philosophy course and consent of instructor. One course. *Brandon, Golding, Jackson, or Roberts*

119. Medieval Philosophy. Christian, Islamic, and Jewish philosophy from late antiquity to 1300. Special emphasis on historical influences and institutional developments. Nature and destiny of humans, existence and nature of God, problem of ethical norms, political philosophy. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

120. Late Medieval and Renaissance Philosophy. Problems of political authority and nature of the state, mysticism, humanism, critical trends, background of Galileo, and impact of the Reformation related to cultural and institutional changes. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

122. Philosophical Issues in Feminism. Issues in political and moral philosophy in their bearing on feminist concerns, including political equality and rights, preferential treatment, feminist and nonfeminist critiques of pornography, and the morality of abortion. C-L: Women's Studies. One course. *Jackson*

132. Nineteenth-Century Philosophy. Emphasis on Hegel, Marx, and Nietzsche. One course. *Staff*

134. Existentialism. One or more major texts, such as Sartre's *Being and Nothingness*. One course. *Roberts or Ward*

135. Philosophy in Literature. Comparative examination of philosophical topics such as freedom, responsibility, good and evil, time and reality. One course. *Roberts*

191, 192, 193, 194. Independent Study. Directed reading and research. Open only to highly qualified students in the junior and senior year with consent of the department. *Staff*

For Seniors and Graduates

203S. Contemporary Ethical Theories. The nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth-century British and American philosophers. One course. *Golding or Jackson*

204S. Philosophy of Law. Natural law theory and positivism; the idea of obligation (legal, political, social, moral); and the relation of law and morality. One course. *Golding*

205S. Philosophy of History. Nature of historical knowledge and inquiry; theories of the historical process. One course. *Roberts*

206S. Responsibility. The relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. One course. *Golding*

208S. Political Values. Analysis of the systematic justification of political principles and the political values in the administration of law. One course. *Golding or Jackson*

211S. Plato. Selected dialogues. One course. *Ferejohn*

217S. Aristotle. Selected topics. One course. *Ferejohn*

218S. Medieval Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

219S. Late Medieval and Renaissance Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

225S. British Empiricism. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. One course. *Peach*

227S. Continental Rationalism. A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. One course. *Peach*

228S. Recent and Contemporary Philosophy. A critical study of some contemporary movements, with special emphasis on analytic philosophers. One course. *Posy*

230S. The Meaning of Religious Language. Prerequisite: consent of instructor. C-L: Religion 230S. One course. *Poteat*

231S. Kant's Critique of Pure Reason. One course. *Posy*

233S. Methodology of the Empirical Sciences. Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, probability and induction, and other topics. Prerequisite: consent of instructor. One course. *Brandon*

234S. Problems in the Philosophy of Science. Selected problems in the physical and nonphysical sciences such as space and time, measurement and determinism. Prerequisite: consent of instructor. One course. *Brandon*

251S. Epistemology. Selected topics in the theory of knowledge, for example, conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*

252S. Metaphysics. Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. One course. *Sanford*

253S. Philosophy of Mind. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons and personal identity. One course. *Sanford*

254S. Philosophy of Religion. Topics such as proofs of the existence of God; meaningfulness of religious language; the problems of evil, immortality, and resurrection. One course. *Roberts*

291S, 292S. Special Fields of Philosophy. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

105. Philosophy of History

108. Social Ideals and Utopias

112. Philosophy of Mind

121. Philosophy and Film

196S, 197S, 198S, 199S. Seminars in Philosophy

202S. Aesthetics: The Philosophy of Art

232S. Recent Continental Philosophy

235S. Hegel and Marx

THE MAJOR

Major Requirements. Eight courses in philosophy including Philosophy 93 and 94; at least one nonintroductory course in moral, social, political, or legal philosophy, such as Philosophy 106, 107, 108, 116, 117, 118, or 122; and at least one course at the 200 level. In addition, a course in logic is highly recommended.

Honors. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

Physics (PHY)

Professor Lewis, *Chairman*; Professor Evans, *Director of Undergraduate Studies*; Professors Biedenharn, Bilpuch, Cusson, De Lucia, Fairbank, Goshaw, Han, Meyer, Robinson, Walker, Walter, and Weller; Associate Professors Fortney, Herbst, and Palmer; Assistant Professors Behringer, Howell, and Oh; Adjunct Professors Guenther and Rogosa; Adjunct Associate Professor Lawson; Adjunct Assistant Professors Kolena and Nelson; Instructors Brown and Skatrud

By studying physics students learn the methods and results of a systematic examination of the objects that make up the natural universe and of their interactions with each other. The knowledge and analytical skills thus obtained are basic to the study of the sciences and engineering. The department offers a number of courses for

nonspecialists who wish to learn about the physicist's description of nature for its intrinsic intellectual value.

32. Physics from the Historical Perspective. The historical development of physical theories is traced from early theories of the solar system to relativity and quantum theory. No previous study of physics is assumed, but the student must be able to use simple mathematics through basic algebra. One course. *Walker or Palmer*

33. Energy: Principles, Problems, Alternatives. Basic principles of physics as related to energy, the energy crisis, possible sources and alternatives. Conservation and environmental aspects of energy consumption. Optional special topics laboratory. No previous knowledge of physics assumed. One course. *Robinson*

36. Acoustics and Music. The physical principles underlying musical instruments, room acoustics, and the human ear. Analysis, reproduction, and synthesis of musical sounds. No previous knowledge of physics is assumed. C-L: Music 36. One course. *Lawson*

41, 42. Fundamentals of Physics. For students interested in majoring in physics; taken in the freshman year. Basic principles of physics, mainly classical, at a level similar to Physics 51, 52, but with emphasis on laying a foundation for further study. Lecture, recitations, and laboratory. Closed to students having credit for Physics 51, 52. Prerequisite: consent of Director of Undergraduate Studies; Mathematics 31 and 32 may be taken concurrently. Two courses. *Han, Palmer, or Goshaw*

51, 52. General Physics. Basic principles of general physics treated quantitatively. Designed for students entering medicine, engineering, and the sciences. Not open for credit to students who have completed Physics 41, 42. Students planning to major in physics should enroll in Physics 41, 42 in their freshman year. Prerequisites: Mathematics 31 and 32 or equivalents; Mathematics 32 may be taken concurrently with Physics 51. Two courses. *Staff*

55. Introduction to Astronomy. The evolving theory of the physical universe. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Several observatory sessions. One course. *Herbst*

100. Introduction to Modern Physics. Survey of modern physics including relativity and the quantum physics of atoms, nuclei, particles, and quarks. Does not count for the physics major. Prerequisites: Physics 51, 52 or 41, 42 and Mathematics 103 (may be taken concurrently). One course. *Han*

105. Introduction to Astrophysics. Basic principles of astronomy treated quantitatively. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Prerequisites: Mathematics 31 and Physics 51, 52 or consent of the instructor. One course. *Kolena*

143. Optics and Modern Physics. Continuation of Physics 41, 42 with more advanced mathematical treatment of selected areas of classical and modern physics. Lecture, recitation, and laboratory. Prerequisites: Physics 41, 42 or 51, 52 and Mathematics 103 (may be taken concurrently). One course. *Goshaw*

171. Electronics. Elements of electronics including circuits, transfer functions, solid-state devices, transistor circuits, operational amplifier applications, digital circuits, and computer interfaces. Lectures and laboratory. Prerequisite: Physics 41, 42 or 51, 52. One course. *Fortney*

176. Thermodynamics and Kinetic Theory. Thermodynamics, kinetic theory, and elementary statistical mechanics. Prerequisites: Physics 41, 42 or 51, 52 and Mathematics 103 (may be taken concurrently). One course. *Behringer*

181. Introductory Mechanics. Newtonian mechanics at the intermediate level, Lagrangian mechanics, linear oscillations, special relativity. Prerequisites: Physics 41, 42 or 51, 52 and Mathematics 111 or equivalent (may be taken concurrently). One course. *Roberson*

182. Electricity and Magnetism. Electrostatic fields and potentials, boundary value problems, magnetic induction, energy in electromagnetic fields, Maxwell's equations, introduction to electromagnetic radiation. One course. *Evans*

185, 186. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications to modern optical devices. Second semester will emphasize nonlinear interactions, optical modulators, lasers, and spectroscopy. Lecture and laboratory projects. Prerequisites: Physics 42 or 52 and Mathematics 103. C-L for 185: Electrical Engineering 213. Two courses. *Guenther or Hacker*

For Seniors and Graduates

211. Modern Physics. Fundamental concepts of quantum theory applied mainly to study of atomic structure and spectra, and to statistical physics. Prerequisites: Physics 181 and Mathematics 111. One course. *Herbst*

214. Introduction to Solid-State Physics. C-L: Electrical Engineering 214. One course. *Hacker*

215. Introduction to Quantum Mechanics. Fundamental postulates; wave mechanics and elementary applications; operators, eigenvalues, and eigenfunctions; angular momentum and rotations; spin and coupling of angular momenta; perturbation theory, transition rates, and selection rules; identical particles; applications. Prerequisites: Physics 181 and 211; Mathematics 111 and 114 (may be taken concurrently). One course. *Robinson*

217S, 218S. Advanced Physics Laboratory and Seminar. Experiments involving the fields of electricity, magnetism, heat, optics, and modern physics. Two courses. *Meyer*

225, 226. Elementary Investigations. Training in the laboratory and library methods of physical research. Qualified students may conduct elementary investigations under the supervision of a member of the staff. Two courses. *Staff*

240. Computer Applications to Physical Measurement. Hardware and software techniques for computer-assisted data acquisition, display, and control in the modern experimental environment. Theory and application of discrete signal analysis including digital filters, Z-transform, and fast Fourier transform. Lecture and laboratory. Prerequisite: Physics 171 or consent of instructor. One course. *Fortney*

COURSES CURRENTLY UNSCHEDULED

102. Applications of Modern Physics in Medicine

106. Topics in Astrophysics

212. Modern Physics

THE MAJOR

Students majoring in physics are prepared for work in industrial and governmental laboratories. They are also prepared for graduate work in physics or for the study of medicine.

Students planning to major in physics should enroll in Physics 41, 42 in their freshman year. They should also arrange to complete the necessary mathematics as soon as possible.

For the A.B. Degree

Prerequisites. Physics 41, 42 or 51, 52, or equivalents; Mathematics 31, 32, 103, 111, or equivalents; and one additional course at the 100 or 200 level.

Major Requirements. Physics 143, 171, 176, 181, and two other courses in physics at the 100 or 200 level.

For the B.S. Degree

Prerequisites. Physics 41, 42 or 51, 52, or equivalents; Mathematics 31, 32, 103, 111, or equivalents; and one additional course at the 100 or 200 level.

Major Requirements. Physics 143, 171, 176, 181, 182, 211, and two other courses in physics at the 100 or 200 level, at least one of which must be a laboratory course. Students planning graduate study in physics are urged to take one additional elective in physics and one in mathematics.

Honors

The department offers seniors the possibility of being associated with research conducted in the department. This work may lead to graduation with distinction. See the section on honors in this bulletin.

Polish

For courses in Polish, see Slavic Languages and Literatures.

Political Science (PS)

Professor Kornberg, *Chairman*; Associate Professor Johns, *Director of Undergraduate Studies*; Professors Ascher, Barber, Braibanti, Cleaveland, Fish, Hall, Holsti, Horowitz, Hough, Leach, Paletz, Price, Spragens, and Valenzuela; Associate Professors Eldridge, Lange, and McKean; Assistant Professors Entman, Gillespie, Grieco, Hoadley, Kitschelt, Lomperis, and Roberts; Professors Emeriti Ball, Cole, Grzybowski, Hallowell, Kulski, and Simpson; Adjunct Associate Professor O'Barr

Courses in political science for undergraduates are offered in four fields: (1) American government, politics, and public administration; (2) comparative government and politics; (3) political theory and methodology; and (4) international law, relations, and politics. In each field, a course numbered at the 90 level serves as an introduction both to the study of political science and to the subject matter and approaches of the field, and middle and upper level courses and seminars (numbered at the 100 and 200 levels respectively) consider particular aspects and topics within the field. In addition, independent study under faculty supervision enables students to explore topics of special interest. See below for the listing of courses by fields, information on internships, and requirements for the major and honors.

INTRODUCTORY COURSES

The following courses introduce the study of political science, and each serves as the basic course in one of the four fields of the discipline. Students ordinarily will take

at least one of these courses before proceeding to more advanced courses. Some advanced courses may require a particular introductory course as a prerequisite.

91. The American Political System. Theory and practice of American government and politics; federal-state relations; the separation and interrelationships of the executive, legislative, and judicial branches of government; judicial review; the role of political parties and public opinion; the formulation and execution of domestic and foreign policy; civil liberties. One course. *Staff*

91D. The American Political System. Same as Political Science 91 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

92. Comparative Politics. Topics include problems of conceptualization and analysis; foundations of politics under democratic, authoritarian, and totalitarian regimes; theories of development and underdevelopment; revolution and collective violence; the role of elites, such as the military. C-L: Comparative Area Studies. One course. *Valenzuela*

93. Elements of International Relations. The nature of international politics, the analysis of national power, the instruments of foreign policy, and the controls of state behavior. C-L: Comparative Area Studies. One course. *Staff*

93D. Elements of International Relations. Same as Political Science 93 except instruction is provided in two lectures and one small discussion meeting each week. C-L: Comparative Area Studies. One course. *Staff*

94. Contemporary Political Ideologies. Liberalism, socialism, Marxism and its variants, fascism, contemporary democratic theory. One course. *Spragens or Gillespie*

OTHER UNDERGRADUATE COURSES

106. International Security. Contemporary and future threats. Regional conflicts, the United States-Soviet strategic balance, theories of deterrence and defense, prospects for arms control. C-L: Comparative Area Studies. One course. *Staff*

107. Comparative Environmental Policies. Comparative analysis of environmental problems and policies in politically diverse industrialized nations including the United States, Russia, and Japan. C-L: Comparative Area Studies and Public Policy Studies 107. One course. *McKean*

108. The American Presidency. The presidency and its impact on the American political system. One course. *Paletz*

109. State and Local Government Today. Problems in state, county, and city government. One course. *Leach*

111. Contemporary Japanese Politics. Introduction to political change in postwar Japan. Foundations of the modern industrial state, electoral politics, policy making and bureaucracy, defense, foreign policy, and foreign trade. C-L: Comparative Area Studies. One course. *McKean*

113. International Political Economy. The interplay between politics and economics in international trade, money, investment, and technology flows among advanced capitalist societies, between developed and developing countries, and between capitalist and socialist countries. C-L: Comparative Area Studies. One course. *Grieco*

114. United States Foreign Policy and Latin America. The postwar period: the Alliance for Progress, counter-insurgency, human rights, Cuba. Particular attention to the United States response to Latin American democracies, dictatorships, and revolutionary movements. C-L: Comparative Area Studies. One course. *Valenzuela*

115. Politics and Society in West Germany. Industrialization, democratization, and fascism in Germany; social structure, political institutions, and political culture; selected public policies; West Germany in the world economy and in world politics. C-L: Comparative Area Studies. One course. *Kitschelt*

118. American Constitutional Development. Prerequisite: Political Science 91 or 91D or consent of instructor. One course. *Fish*

120. International Conflict and Violence. Nature and processes of international conflict and violence with emphasis on contemporary instances of violence in international affairs. Consideration of restraints on violence. C-L: Comparative Area Studies. One course. *Eldridge*

121. International Organization. Political aspects of military and economic organizations at the global and regional levels of the international system. C-L: Comparative Area Studies. One course. *Grieco*

122. Modern International Politics. The major problems in contemporary international affairs with attention to superpower politics, specific regional concerns, and the problems associated with the emergence of a new international economic order. C-L: Comparative Area Studies. One course. *Eldridge*

123. Introduction to Political Philosophy. The nature and enduring problems of political philosophy, illustrated by selected theorists in the Western political tradition. One course. *Gillespie or Spragens*

125. Strategies of Comparative Analysis. C-L: Anthropology 125, Comparative Area Studies, History 137, Interdisciplinary Course 125, and Sociology 125. One course. *Staff*

126. Democratic Theory and Political Reality. Normative goals and empirical analysis of existing democratic states. One course. *Spragens*

127. Law and Politics. Nature and functions of law; Anglo-American legal institutions; the process of judicial decision making; and the relationships among judges, lawyers, legislators, and administrators in the development of public as well as private law. One course. *Fish*

128. Congress and the Presidency. Policy making in the executive and legislative branches of the United States government, with particular attention to intragovernmental relations. One course. *Staff*

129. Political Participation. The motives, methods, and results of the activities of individuals and groups and of social movements. C-L: Women's Studies. One course. *Paletz*

131. Introduction to American Political Thought. Basic elements in the American political tradition as developed from its English roots to the present. One course. *Leach*

132. Politics of Asia. The impact of nationalism, development, and revolution on traditional Asian society and its emerging states. One course. *Lomperis*

135. Political Development of Western Europe. The development of the modern political systems of Britain, France, Germany, and other European countries; the spread of capitalism, the emergence of mass democracy and the rise of the welfare state. Contemporary developments examined in historical and theoretical perspective. C-L: Comparative Area Studies. One course. *Lange*

136. Comparative Government and Politics: Western Europe. Modern political institutions and processes of European democracies: political parties, interest groups and parliaments; regional, religious and class divisions; political participation and

mobilization; relationships of state, society and economy; political, social and economic change in postwar Europe. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

138. Quantitative Political Analysis I. Basic applications of statistical methods to the analysis of political phenomena. Emphasis on research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or are enrolled in Political Science 236, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 222, or Sociology 132, 133, or 293. One course. *Hoadley*

139. Bureaucracy and Public Policy. One course. *Staff*

141. Public Administration. An introduction to the role of administration in the governmental process considering principles of administrative organization, methods of administrative control, personnel, and fiscal management. In general, the study of the organizational and administrative problems encountered by any government agency charged with carrying out public policy. One course. *Cleaveland*

143. Politics of Liberties. Theory and development of the Bill of Rights with attention to Supreme Court decisions and to cultural and political forces. Not open to students who have taken Political Science 100. One course. *Fish*

144S. American Political Thought since the Gilded Age. The Progressive period and the recurring themes of contemporary debate. Attempts to refurbish or develop alternatives to the dominant liberal tradition. The ideological roots of black, feminist, and conservative protest. One course. *Price*

145. Political Analysis for Public Policy Making. C-L: Public Policy Studies 114. One course. *Ascher or Entman*

146. American Legislative Behavior. An introduction to the American legislative process, with specific focus on the U.S. Congress. Emphasis on legislative rules and procedures, congressional elections, and the behavior of legislators in their representative and policy-making roles. One course. *Hoadley*

147. International Environmental Politics and Policies. Environmental issues in developing countries in the context of the North-South problem; transboundary pollution problems and international trade; problems of the global commons (such as the deep sea, the upper atmosphere, genetic resources); international organizations and environmental policy. C-L: Comparative Area Studies. One course. *McKean*

149. United States and East Asia. American military intervention in China, Korea, and Vietnam; contemporary United States relations with Japan, China, and other Asian nations; new trends and sources of tension in East Asia and the Pacific. C-L: Comparative Area Studies. One course. *McKean*

151. Introduction to Latin American Politics. Historical and cultural context of political institutions and behavior, the role of traditional and emerging groups and forces, political instability and the decision-making process. C-L: Comparative Area Studies. One course. *Valenzuela*

153, 154. Politics and the Media of Mass Communication. Analysis of the nature, organization, and products of the mass media (especially the movie, television, and newspaper industries) as they affect the political systems, political processes, institutions, and people of the United States and other nations. It is desirable but not required that students taking 153 continue with 154. With consent of the instructor, students who have not taken 153 may enroll in 154. C-L: Film. Two courses. *Paletz*

156. Space, Weapons, and War. Historical development of the relations between the exploration of space, anti-satellite and other space weaponry, and theories of war in international politics. One course. *Roberts*

157. Foreign Policy of the United States. Sources of American foreign policy, containment, international economic policy, deterrence, arms control, and disarmament. Prospects for the future. Emphasis on the period since World War II. C-L: Comparative Area Studies. One course. *Holsti*

159. Ambition and Politics. A theoretical examination of the role of ambition in politics, including works by or on Plato, Plutarch, Machiavelli, Shakespeare, Madison, Tocqueville, and Hitler. One course. *Gillespie*

160. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Religion 156, and Sociology 175. One course. *Staff*

161S. Comparative Government and Politics: Africa. Nationalism, nation building, and problems of development in sub-Saharan Africa. C-L: Comparative Area Studies. One course. *Johns*

163. Gender, Politics, and Policy: The Third World Case. A comparative analysis of pre-colonial, colonial, and post-colonial politics and distribution of political power between women and men. C-L: Comparative Area Studies. One course. *O'Barr*

165. Government and Politics of the Soviet Union. Analysis of the Soviet political system, emphasizing the sources of stability and instability and the responsiveness of its policies. Literature on the non-Soviet world (notably the United States) will be included. C-L: Comparative Area Studies. One course. *Hough*

166. Soviet Foreign Relations. Nature of relations with other states. Determinants and formulation of foreign policy. C-L: Comparative Area Studies. One course. *Hough*

167. International Law. Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recognition, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. C-L: Comparative Area Studies. Not open to students who have had Political Science 227. One course. *Pye*

169. Politics in Revolutionary China. Political process in China since 1949, with emphasis on ideological shifts in the Cultural Revolution and the post-Mao era. Party politics, leadership, economic organization, thought reform, mass mobilization, and socialist transformation. China as an emerging world power. C-L: Comparative Area Studies. One course. *McKean*

171S. Race, Class, and Colonialism in Southern Africa. Domination and opposition in the countries of southern Africa; political consequences of differing forms of colonialism, white settlement, nationalism, and industrialization. C-L: Comparative Area Studies. One course. *Johns*

172. Political Economy of Global Natural Resources. Analysis of mineral and energy policies of selected countries. Focus upon relationships between producer and consumer countries, transnational corporations, and international cartels. C-L: Comparative Area Studies. One course. *Johns*

173S. Political Economy of World Food Problems. Changing policies toward food production and distribution. Topics include American agricultural policy, international food and famine aid, and Third World agricultural development strategies. C-L: Comparative Area Studies. One course. *Johns*

174S. Political Biography. Nature of politics as revealed in the life histories of individuals. Readings in single biographies and autobiographies, but with some com-

parative work. Students project their autobiographies toward possible political futures. One course. *Barber*

175. Political Parties and Legislatures in Western Democracies. The origin, maintenance, and functions of party and legislative systems in Western democratic societies. C-L: Canadian Studies and Comparative Area Studies. One course. *Kornberg*

176. Perspectives on Food and Hunger. See C-L: Interdisciplinary Course 120A; also C-L: Comparative Area Studies. One course. *Johns*

177, 178. Contemporary Social and Political Development in the Islamic World. An analysis of contemporary events in Iran, Afghanistan, Pakistan, Iraq, and the Arabian Peninsula; the political manifestation of Shi'ia and Sunni Islam; the role of imams and ayatollahs in the politics of Muslim countries; considerations of security in the Arab world and its relationship to global power politics. C-L: Comparative Area Studies. Two courses. *Braibanti*

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies 184, Comparative Area Studies, Economics 184, and History 184. One course. *Leach*

186. Political Leadership. The development, characteristics, and impact of political leaders. Biographical and collective studies are considered primarily from a psychological perspective. One course. *Barber*

187. Politics and the Libido. Effects of the libido on elite and mass political activities. Government regulation of sex-inspired behavior. C-L: Women's Studies. One course. *Paletz*

188. The Psychology of Political Symbols. The role of symbolic political issues in determining public attitudes and voting behavior. Symbolic political issues such as "law and order," pornography, and prohibition; distinguished from public welfare issues such as employment policies. One course. *McConahay*

189, 190. Internship. Open to enrollment by students engaging in practical or governmental work experience during the summer or a regular semester. To enroll, a student must obtain the approval of the Director of Undergraduate Studies, arrange employment, and secure the agreement of a faculty member in the department to supervise a program of study related to the work experience. Two courses. *Paletz*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of the Director of Undergraduate Studies and of the supervising instructor. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to seniors by consent of the Director of Undergraduate Studies and of the supervising instructor. Two courses. *Staff*

195. Comparative Political Behavior in the United States and Canada. Similarities and differences in political environments and their impact on political institutions and processes. C-L: Canadian Studies and Comparative Area Studies. One course. *Kornberg*

196A-D. American University Washington Semester. This number represents transfer course credit for courses taken at American University in the Washington Semester Program: Washington Semester Seminar I, Washington Semester Seminar II, Washington Semester Internship, and an elective or research project. If any of the above courses at American University are taken outside the political science department, approval must be obtained beforehand from the Director of Undergraduate Studies of the appropriate Duke department in order to obtain transfer credit. Four transfer credits.

197S-198S. Senior Honors Thesis. Preparation and writing of research paper; group meetings to present topics and for discussion. Open only to senior political science majors in the honors program. See section on honors under description of the major. Two courses. *Staff*

200S. Senior Seminars. One course each. *Staff*

A. American Government and Politics

B. Comparative Government and Politics

C. Political Theory

D. International Relations

For Seniors and Graduates*

201S. Problems in International Security. Major security issues. Prerequisite: a course in international relations or American foreign policy. C-L: Comparative Area Studies. One course. *Staff*

203S. Politics and the Media of Mass Communication. Analysis of crucial aspects of the media-politics relationship. Media's effects on political socialization, public opinion, political participation, pluralism, power, and authority. Government's impact on the media. Prerequisite: consent of instructor. C-L: Film. One course. *Paletz*

204S. Ethics in Political Life. Ethical issues arising in the conduct of political vocations and activities. C-L: Public Policy Studies 204S. One course. *Spragens*

207S. American Constitutional Interpretation. Development of the Constitution of the United States through Supreme Court decisions. One course. *Fish*

208S. Analyzing the News. C-L: Public Policy Studies 240S. One course. *Entman*

209. Problems in State Government and Politics. One course. *Leach*

211S. Current Problems and Issues in Japanese Politics. Sources of strength and weakness in the Japanese economy, the rise of new issues and strains in post-industrial society, changes in the party system and decision-making process, the possible transfer of power, the challenge of Japan's new world role. C-L: Comparative Area Studies. One course. *McKean*

213S. Theories of International Political Economy. Comparison and assessment of traditional and modern theories in terms of their logical and empirical validity. C-L: Comparative Area Studies. One course. *Grieco*

214S. The Politics of Scarcity. Issues in politics, economics, ethics, and policy associated with conflicts arising from long-term scarcity in crucial resources. One course. *McKean*

218S, 219S. Political Thought in the United States. 218S: The Founders and their European and Puritan antecedents; debates over slavery and the Union. 219S: topics in late nineteenth- and twentieth-century thought. Two courses. *Price*

220S. Problems in International Politics. Prerequisite: one course in international relations, foreign policy, or diplomatic history. C-L: Comparative Area Studies. One course. *Holsti or Hough*

223. Ancient Political Philosophy. Intensive analysis of the political philosophy of Plato, Aristotle, and other ancient theorists. One course. *Gillespie*

224S. Modern Political Theory. A historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nine-

*The following courses may be taken by juniors who have earned a 3.0 average and who have obtained the consent of the instructor.

teenth century. The rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. One course. *Spragens*

225. Topics in Comparative Government and Politics: Western Europe. Topics vary: the development of mass democracy and the welfare state; political and electoral participation and mobilization; social movements and political change; center-periphery conflicts; government and bureaucratic institutions and their relationships to society; the modern welfare state and political economy. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

226S. Theories of International Relations. An overview with applications to political-military and political-economic empirical problems. C-L: Comparative Area Studies. One course. *Grieco*

227. International Law. Theory and practice of international law: rights and duties of states with respect to recognition, state territory and jurisdiction, treaties, settlement of disputes, and other topics. C-L: Comparative Area Studies. One course. *Pye*

228S. Nineteenth and Twentieth Century Political Philosophy. Topics in nineteenth and twentieth century political philosophy, considering such authors as Hegel, Marx, Nietzsche, Dostoevski, Heidegger, Malraux, and Camus. One course. *Gillespie*

229S. Contemporary Theory of Liberal Democracy. One course. *Spragens*

232. Political Economy: Theory and Applications to Western Europe. Selected topics. C-L: Comparative Area Studies. One course. *Lange*

233S. Quantitative Political Analysis II. Intermediate statistical methods, especially linear regression, for political science research. Emphasis on assumptions and interpretations of results. Prerequisite: Political Science 138 or 236 or equivalent. One course. *Hoadley*

234S. Political Economy of Development: Theories of Change in the Third World. Alternative approaches to political, economic, and social change in Latin America, Africa, and Asia. C-L: Anthropology 234S, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, Smith, or Valenzuela*

235S. Comparative Development of Islam. Comparative development of Islam in Indonesia, Malaysia, Pakistan, India, North Africa, and sub-Saharan Africa. A comparative analysis of the resurgence of Islam as a religious, political, and cultural force. C-L: Comparative Area Studies. One course. *Braibanti*

236. Statistical Analysis. Introduction to statistics in political research, emphasizing research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or are enrolled in Political Science 138, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 122, or Sociology 132, 133, or 293. One course. *Hoadley*

237S. Comparative Public Policy. Introduction to methods, concepts, and theories of comparative public policy analysis. Substantive policies examined in the course vary each semester and may include economic, industrial, social, and civil rights policies. One course. *Kitschelt*

240. American Political Behavior. One course. *Staff*

242S. Comparative Law and Policy: Ethnic Group Relations. C-L: Comparative Area Studies, Law 572, and Public Policy Studies 242S. One course. *Horowitz*

245. Ethics and Policy Making. C-L: Public Policy Studies 223. One course. *Price*

248. The Politics of the Policy Process. C-L: Public Policy Studies 219. One course. *Staff*

249. Comparative International Development and Technology Flow. Analysis of social, political, and economic development in Third World countries. The internal problem of maintaining political systems and the external problem of adapting intermediate or appropriate technologies. C-L: Comparative Area Studies. One course. *Braibanti*

251S. The American Presidency. One course. *Paletz*

253S. Comparative Government and the Study of Latin America. Current literature on major themes of Latin American politics. C-L: Comparative Area Studies. One course. *Valenzuela*

255. Political Sociology. C-L: Sociology 255. One course. *Smith, Stark, or Tiryakian*

256S. Arms Control and National Security Policy. The evolution of nuclear weapons and strategy and of global defense policy toward the Soviet Union and other adversaries; the arms control process and nonproliferation. Prerequisite: consent of instructor. One course. *Lomperis*

259S. Low Intensity Conflict and the Lessons of Viet Nam. The Viet Nam conflict and comparative cases; implications for Western interventions in the Third World. Prerequisite: consent of instructor. One course. *Lomperis*

260. The Tradition of Political Inquiry. Past and present problems, goals, pre-suppositions, and methods. One course. *Spragens*

261. Politics and the Future. The projection of possible political orders: the effects of changing resources, technologies, and values on mankind's ability to govern. One course. *Lomperis*

262S. International Communism. C-L: Comparative Area Studies. One course. *Hough*

263S. Methods of Political Science. The relation between theory and evidence; research designs for the comparative analyses of historical and statistical evidence. One course. *Roberts*

264. The President and the Federal Bureaucracy. Presidential management of the executive branch, including the development of the modern institutional presidency; an analysis of bureaucratic politics, its causes and effects; and an examination of executive-legislative relations in managing the bureaucracy. One course. *Cleaveland*

267S. Policy Making in International Organizations. C-L: Comparative Area Studies and Public Policy Studies 267S. One course. *Ascher*

275. The American Party System. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. One course. *Kornberg*

277. Comparative Party Politics. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. C-L: Comparative Area Studies. One course. *Kornberg or Lange*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, and Sociology 282S. One course. *Leach*

283S. Congressional Policy Making. Lawmaking and oversight of the executive branch by the U.S. Congress. Committee, party, executive, and interest group roles. C-L: Public Policy Studies 283S. One course. *Price*

284S. Public Policy Process in Developing Countries. C-L: Comparative Area Studies and Public Policy Studies 284S. One course. *Ascher*

286S. Judicial Administration. Organization, case processing, and management of courts with emphasis on federal appellate courts. Prerequisite: Political Science 127. C-L: Law 534. One course. *Fish*

293. Federalism. Theoretical and operational aspects of federal systems of government, focusing on the United States and Canada. C-L: Canadian Studies and Comparative Area Studies. One course. *Leach*

COURSES CURRENTLY UNSCHEDULED

112S. Shaping the News

137. Political Behavior in Elections

280S. Comparative Government and Politics: Sub-Saharan Africa

POLITICAL INTERNSHIPS

The department administers an internship program, primarily in Washington, DC, for political science majors and interested nonmajors. Students participate by qualifying for a position obtained by the department or by acquiring their own relevant employment, with or without compensation. They also attend sessions with guest speakers in Washington during the summer. Course credit can be obtained by enrolling in Political Science 189 or 190 and writing an analytical paper. Potential applicants should contact the Internship Director, Louise Walker, (327 Perkins) at any time, but preferably in the fall semester.

POLITICAL SCIENCE COURSES BY FIELDS

Political science courses for undergraduates are offered in four fields, as noted below; students majoring in the department must complete at least one course in each of three fields.

American Government, Politics, and Public Administration. Political Science 91, 91D, 108, 109, 112S, 118, 124, 127, 128, 129, 137, 139, 141, 143, 145, 146, 154, 174S, 186, 187, 188, 189, 190, 191,* 192,* 193,* 194,* 196, 197S–198S,* 200S A, 203S, 207S, 208S, 209, 240, 248, 251S, 264, 275, 283S, 286S.

Comparative Government and Politics. Political Science 92, 107, 111, 115, 125, 132, 135, 136, 151, 153, 161S, 163, 165, 169, 171S, 172, 173S, 175, 176, 177, 178, 184, 191,* 192,* 193,* 194,* 195, 197S–198S,* 200S B, 211S, 214S, 225, 232, 234S, 235S, 237S, 242S, 249, 253S, 255, 277, 280S, 282S, 284S, 293.

Political Theory and Methodology. Political Science 94, 123, 126, 131, 138, 144S, 159, 191,* 192,* 193,* 194,* 197S–198S,* 200S C, 204S, 218S, 219S, 223, 224S, 228S, 229S, 233S, 236, 245, 260, 263S.

International Law, Relations, and Politics. Political Science 93, 93D, 106, 113, 114, 120, 121, 122, 147, 149, 156, 157, 160, 166, 167, 191,* 192,* 193,* 194,* 197S–198S,* 200S D, 201S, 213S, 220S, 226S, 227, 256S, 259S, 261, 262S, 267S.

THE MAJOR

Requirements. Eight courses in political science including (1) at least one course in each of three fields; (2) at least one course at the 200 level; and (3) no more than three cross-listed courses originated outside the Department of Political Science. (Such cross-listed courses appear in the preceding listing without descriptions.)

*If subject matter is appropriate to the field.

Of the eight required political science courses, at least six must be taken at Duke to meet major requirements, five if the student: (1) is transferring courses from a year-long approved study abroad program; or (2) transferred to Duke after completing two undergraduate years at another institution; or (3) completed one semester at an approved study abroad program and one semester at the Washington Semester Program at American University. For the purpose of this requirement courses in the Washington Semester Program at American University will be counted as transfer courses.

Suggested Work in Related Disciplines. Several courses in such disciplines as anthropology, economics, history, philosophy, psychology, public policy, religion, and sociology are desirable.

Honors. The department offers students majoring in political science a senior honors program, by successful completion of which a participant achieves graduation with distinction in political science. The central feature and requirement of the program is the honors thesis which the student prepares under faculty supervision. Students who have attained at least a 3.3 grade average overall and a 3.5 average in political science courses may enter the program by submitting, prior to the end of the second semester of the junior year, a research proposal to the departmental honors committee and also obtaining consent of a faculty member to supervise the proposed thesis. In the first semester of the senior year, accepted students take Political Science 197S with emphasis on research methods. The following semester they take Political Science 198S during which their thesis is written, presented orally, and evaluated by the honors committee. Graduation with distinction is awarded to students receiving a grade of A- or better. Further information may be obtained from the chairman of the honors committee or the Director of Undergraduate Studies.

Psychology (PSY)

Professor Carson, *Chairman*; Professor R. Erickson, *Director of Undergraduate Studies*; Professors Alexander, Bevan, Borstelmann, Coie, Costanzo, Diamond, C. Erickson, Martin Lakin, Lockhead, H. Schiffman, Staddon, M. Wallach, and Wing; Associate Professors Casseday, Day, Eckerman, W. C. Hall, W. G. Hall, McConahay, Roth, and Rubin; Assistant Professors Dix, Fitzpatrick, Kremen, and Putallaz; Professor Emeritus Kimble; Associate Professor Emeritus Banham; Adjunct Professors Brodie, Campbell, and Crovitz; Lecturers Barnes, Clark, Cofer, Cooper, B. Erickson, Herman, Hilkey, Keefe, King, Musia Lakin, Lochman, Logue, Marsh, Page, Payne, Pinkerton, Pitts, Sawyer, S. Schiffman, Shipley, Somjen, Surwit, Thompson, L. Wallach, Williams, and Wolbarsht

Students taking their first course in psychology are expected to participate as subjects in three to six hours of psychological research. This requirement must be met even though a student has received advanced placement.

11. Introductory Psychology. Biological bases of behavior, psychological development, cognitive psychology, personality, abnormal behavior, and social psychology. One course. *Staff*

101. Learning and Adaptive Behavior. Principles of instrumental learning in animals and humans. Prerequisite: none, but some knowledge of quantitative science is desirable. C-L: Zoology 101. One course. *Staddon*

102. Sensation and Perception. Principles of organization of perceptual systems, including sensory systems (vision, audition, proprioception, and chemical senses); pattern recognition; perceptual anomalies; attention; methods of measurement. Prerequisite: Psychology 11. One course. *R. Erickson or Lockhead*

103. Biological Basis of Behavior. Physiological, developmental, and evolutionary approaches to behavior. Sensory and cognitive processes, sleep, pain, emotion, hunger, and thirst as well as maternal and sexual behavior patterns are considered. Prerequisite: none, but an introductory course in psychology or biology is desirable. One course. *C. Erickson or W. G. Hall*

104. Personality. Representative theories of personality from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. Prerequisite: Psychology 11. One course. *Alexander, Carson, Kremen, Martin Lakin, or H. Schiffman*

105. Developmental Psychology. Theory and research on growth and behavior from infancy to adolescence. Prerequisite: Psychology 11. One course. *Borstelmann, Dix, Eckerman, or Putallaz*

106. Social Psychology. Problems, concepts, and methods in the study of social interaction and interpersonal influence. Prerequisite: Psychology 11. C-L: Sociology 106. One course. *Costanzo or George*

107. Cognitive Psychology. Cognition, including pattern recognition, concept formation, attention, memory, imagery, language, problem solving, and thinking. Emphasis is both empirical and theoretical. Prerequisite: Psychology 11. One course. *Day*

109. Abnormal Psychology. Disordered behavior and constructive personality change viewed in interpersonal and social context for purposes of understanding normal and abnormal personality development and functioning. Prerequisite: Psychology 11. One course. *Carson or H. Schiffman*

110. Applied Psychology. Applications of psychology to problems of personnel selection, industrial efficiency, advertising, and selling. Prerequisites: Psychology 11 and 117. One course. *Wing*

117. Statistical Methods. Elementary statistical techniques and their application to the analysis and interpretation of social science data. Theory of inference is stressed. Not open to students who have had Economics 138 or Mathematics 53 or 117. C-L: Sociology 133. One course. *Spenner or staff*

118. The Psychology of Individual Differences. Nature and causes of individual and group variations in intelligence, special abilities, social and emotional characteristics. Prerequisites: Psychology 11 and 117. One course. *Wing*

122S. Child Observation. Observation of children in the group setting of the University Preschool and Primary Program. Aspects of personality, social development, and child-adult relationships. Open only to junior and senior psychology majors with consent of instructor. One course. *Musia Lakin*

126. Behavior and Neurochemistry. The role of brain chemicals (transmitters, peptides, and hormones) in behavior. Hypotheses addressing the neurobiology of mental disorders. Prerequisite: Psychology 103. One course. *Cooper*

130. Psychosocial Aspects of Human Development. See C-L: Interdisciplinary Course 180; also C-L: Human Development and Sociology 169. One course. *Martin Lakin and Maddox*

134. Psychology of Language. Psychological "reality" of linguistic structures, language and cognition, biological bases, animal communication, language pathologies, nonverbal communication, language vs. music, linguistic universals, and bilingualism. Everyday language phenomena (e.g., slips of the tongue) as well as the experimental and theoretical literature. Prerequisite: Psychology 11; Psychology 107 is desirable. C-L: Linguistics. One course. *Day*

135S. Hormones and Behavior. The endocrine system and hormones in maternal, sexual, and emotional behavior. Prerequisite: Psychology 103. C-L: Women's Studies. One course. *B. Erickson*

136. Advanced Developmental Psychology. Issues, concepts, and methods in psychological development, e.g., comparative social development, social cognition, adolescence. Prerequisite: Psychology 105 or consent of instructor. One course. *Staff*

139. Motivation. The psychobiology of such concepts as motivation, drive, incentive, reward, and goal-directed behavior. The neural mechanism; development perspectives. Prerequisite: Psychology 11 or 102 or 103. One course. *W. G. Hall*

Note: Laboratory courses (140S through 148S) are open chiefly to juniors and seniors. The subject matter varies, but the courses have in common a concern with the design and execution of psychological experiments. Students will find them helpful as a means of gaining experience before engaging in independent study.

140S. Research Methods in Child Psychology. Prerequisite: Psychology 105. One course. *Eckerman or L. Wallach*

141S. Tests and Measurements. Test methods used by psychologists to measure and evaluate mental processes. Prerequisites: Psychology 11 and 117 or equivalents. One course. *Wing*

143S. Experimental Methods in Cognitive Psychology. Human cognition; language, memory, problem solving, and other higher mental processes. Prerequisite: Psychology 107. One course. *Rubin*

144S. Learning and Adaptive Behavior. Basic principles of adaptive behavior in animals, with emphasis on the effects of reinforcement. Prerequisite: Psychology 102 or 103 or consent of instructor. One course. *Staff*

145S. Experimental Approaches to Personality. Methods applied to personality research. Prerequisite: Psychology 104. One course. *M. Wallach or Wing*

146S. Experimental Comparative Psychology. Animal behavior from evolutionary and physiological viewpoints. Emphasis on methodology. Prerequisite: Psychology 102 or 103. One course. *Staff*

147S. Experimental Social Psychology. Group dynamics, attitude change, and interpersonal perception. Prerequisite: Psychology 106. One course. *Staff*

148S. Perception. Experimental approaches to basic phenomena of perception as determined by conditions in the external situation and the person: biological and psychological. Prerequisite: Psychology 102. One course. *Lockhead*

151S-152S. Child Clinical Psychology. Theories of clinical intervention with children and families; research on prediction of adult disorders from childhood problems, evaluation of therapy and epidemiological data. Practicum with children in schools, coupled with in-class training. Prerequisites: Psychology 105 and 109. 151S: fall semester, one course. 152S: spring semester, half course. *Coie*

153S. Child Rearing: Theories, Research, Realities. Analysis of issues, concepts, and studies on determinants of general trends and individual variations in the care and training of children from infancy to adolescence. Prerequisite: Psychology 105; Psychology 117 and 140 are recommended. One course. *Borstelmann*

154S. Education, Children, and Poverty. Psychological hypotheses concerning the roles of preschool intervention programs, improved quality of resources, teacher expectancy effects, and enhancement of pupil self-confidence, in relation to the goal of improved cognitive competence for poverty background children. Criteria for de-

fining competence, such as scores on psychometric intelligence tests, performing on Piagetian tasks, and development of specific skills. Interpretations concerning intelligence and cognitive deprivation in poor children in the light of relevant psychological evidence. Prerequisite: one course in psychology or consent of instructor. One course. *M. Wallach*

166. Comparative Neurobiology. The evolution and functional organization of the vertebrate brain. A study of the original papers of the pioneers in evolution, neuropsychology, and neuroanatomy. Prerequisite: consent of instructor. C-L: Anatomy 166, Anatomy 266, and Psychology 266. One course. *Diamond and W. C. Hall*

170. A-F. Selected Problems. One course each. *Staff*

171T, 172T, 173T, 174T. Junior-Senior Tutorials. Small group discussions about influential books and articles in psychology. The availability of tutorials, their content, and the instructors will be announced before registration. Prerequisites: Psychology 11 or two courses from Psychology 101 through 109 and Psychology 117 or the equivalent and consent of Director of Undergraduate Studies. Pass/fail only. Half course each. *Staff*

181S. Art and Its Making. An inquiry into artistic process from a conceptual survey of dominant views to direct interviewing of and discussion with artists. Prerequisites: junior or senior standing and consent of instructor. C-L: Institute of the Arts 181S and Interdisciplinary Course 181S. One course. *Kremen*

191, 192. Independent Study. Directed reading and research. Prerequisite: consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Limited to seniors. Two courses. *Staff*

199S. Great Books in Biology: Evolution, Genetics, Neurobiology. Analysis of original texts by great pioneers in biology—Darwin, Mendel, Galton, Claude Bernard, Sherrington, and others. Prerequisite: junior standing. One course. *Diamond*

For Seniors and Graduates

Courses at the 200 level are open to selected undergraduates only with written consent of the instructor.

202S. Great Ideas in Psychology. Ideas in psychology drawn from various content areas (e.g., perception, personality, motivation, biological bases, social, cognitive, developmental, learning, clinical) and methodological approaches (e.g., experimental, introspection, observation, interview, longitudinal, simulation). Prerequisite: consent of instructor. One course. *Day*

203S. Sensation and Perception. Classical and current concepts and methods. One course. *Lockhead*

210S. Cognition. Cognitive psychology (attention, memory, language, and problem solving). Problems such as forms of representation, individual differences, and modes of thinking. Emphasis on alternative experimental and theoretical approaches. One course. *Day*

212S. Human Memory. Literature, classical and modern; data and theories relating to mechanisms of information processing, storage, and retrieval. One course. *Rubin*

214S. Development of Social Interaction. Major concepts and methods pertaining to early social development, emphasizing human social behavior and a developmental psychobiological approach. One course. *Eckerman*

215S. Cognitive Development. Intensive critical evaluation of major approaches to the development of knowledge, including Piaget, Thomas Kuhn, Vygotsky, Eleanor Gibson, Kohlberg, and others. One course. *L. Wallach*

216S. Biological Psychology. The neural basis of behavior with special emphasis on the organization and evolution of the neocortex and the dorsal thalamus. A historical approach, using original texts by LeGros Clark, Elliot Smith, Herrick, Sherrington, Cajal, Campbell, and many others. While emphasis is on the neocortical sensory systems, the structure and function of the limbic system and hypothalamus are reviewed. C-L: Anatomy 216S. One course. *Diamond*

217S. Social Psychology. Social factors in cognition, models of social interaction, conformity and social influence, and attitude development and change. One course. *Costanzo*

219S. Neural Bases of Behavior. Structure and function of the nervous system as related to problems of sensory-motor processes, learning, motivation, and memory. One course. *C. Erickson and R. Erickson*

220S. Psycholinguistics. Selected topics such as psychological "reality" of linguistic structures, neurolinguistics, language and personality, linguistic versus pictorial representation, individual differences, oral versus written expression, and the language-thought interaction. C-L: Linguistics. One course. *Day*

230S. Social Behavior of Animals. Developmental, ecological, and physiological aspects of territorial, sexual, parental, and aggressive behavior. One course. *C. Erickson*

234S. Personality. Selected topics of current interest concerning empirical research on personality. Strategies for the definition of research questions and the evaluation of research progress. One course. *M. Wallach*

245S. Personality Theory. Representative theories of human functioning, from Freud to contemporary approaches. One course. *Kremen or staff*

266. Comparative Neurobiology. Prerequisite: consent of instructor. See C-L: Psychology 166; also C-L: Anatomy 166 and Anatomy 266. One course. *Diamond and W. C. Hall*

271S. A-F. Selected Problems. One course each. *Staff*

272S. Physiology of the Central Nervous System. Prerequisites: Physiology 200 or equivalent and Physiology 270 or equivalent and knowledge of neuroanatomy; for undergraduates, consent of instructor. C-L: Physiology 272S. Half or one course. *Somjen and staff*

273S, 274S. Statistical Principles in Experimental Design. The problems of scientific inference; methods of data analysis and issues in experimental design. Two courses. *Roth*

286S. Biological Basis of Hearing. Anatomy and physiology of the auditory system; neural mechanisms for localization of sound, frequency discrimination, and discrimination of temporal patterns of sound such as speech; disorders of hearing. One course. *Casseday*

295S. Group Psychotherapy and Processes. Past and current trends in group intervention techniques. Field observations. One course. *Martin Lakin*

COURSES CURRENTLY UNSCHEDULED

137. Physiological Basis of Perception

238S. Electroencephalogram and Psychological Function

THE MAJOR

Psychology Courses by Fields and Levels. For the purpose of defining the requirements for the Bachelor of Arts and Bachelor of Science degrees, certain psychology courses are grouped by content areas (A and B) and also by lower and upper levels (1 and 2). These groups are constituted as follows:

A-1: 101, 102, 103, 107

B-1: 104, 105, 106, 109

A-2: 110, 118, 126, 134, 135S, 137, 139, 141S, 143S, 144S, 146S, 148S, 202S, 203S, 210S, 212S, 216S, 219S, 220S, 230S, 238S, 272S, 286S

B-2: 122S, 130S, 136, 140S, 145S, 147S, 151S-152S, 153S, 154S, 215S, 217S, 234S, 245S, 295S

All courses numbered above 109 are upper level courses and all may be used to fulfill the requirements (see below) for a third upper level course.

For the A.B. Degree

Eight courses in psychology, including 117; one course from each of the groups A-1, B-1, A-2, B-2; three additional courses of the student's selection, one of which must be upper level (above 109). Mathematics 53 or 117 or Economics 138 may be substituted for Psychology 117 but does not count as one of the eight required psychology courses. Note that although Psychology 11 is not required for the major, it is a prerequisite for certain courses and it counts toward the eight-course major requirement.

For the B.S. Degree

The Bachelor of Science degree program consists of the above requirements plus two calculus courses and six natural science or 100-level mathematics courses.

Independent Study

A program of individualized readings or an empirical research project may be carried out by arrangement with a faculty supervisor and enrollment in Psychology 191-194. A written plan of the program must be approved by the supervisor and the Director of Undergraduate Studies. Credit for 191-194 may be recorded either as pass/fail or by means of letter grades.

Honors

Any student majoring in psychology with an overall grade point average of 3.0 and a grade point average of 3.3 in psychology courses may be a candidate for graduation with distinction in psychology. Recommendation for this honor is made by a faculty committee which evaluates a thesis submitted by the candidate and administers an oral examination. Honors candidates typically enroll in independent study courses during one or more semesters, often as early as the junior year, but enrollment in independent study is not a precondition of candidacy. All eligible students are encouraged to carry out honors work and to secure the sponsorship of a faculty supervisor. See the section on honors in this bulletin.

Public Policy Studies (PPS)

Associate Professor Behn, *Chairman*; Associate Professor Kuniholm, *Director of Undergraduate Studies*; Bonnie Bain, *Director of Internship Programs and Placement Services*; Professors Ascher, Barber (political science), Clotfelter, Cook, Eddy, Fleishman (law), Gillis, Horowitz (law), Hough (political science), Pearsall (engineering), and Price (political science); Associate Professors Lipscomb, McConahay, and Stack; Assistant

Professors Entman, Luger, and Shetty; Professors of the Practice Geller, Stubbing, and Yaggy (Medical Center); Adjunct Professor Owen; Visiting Professor Coles; Lecturers Green, Harris, and Payne

Courses in public policy are open to all students providing that any prerequisites are met.

55. Analytical Methods for Public Policy Making. Basic concepts of analytical thinking including quantitative methods for assessing the probabilities of outcomes and appraising policy alternatives. Illustrated by problems faced by busy decision makers in government, business, law, medicine, etc. One course. *Lipscomb or Shetty*

107. Comparative Environmental Policies. See C-L: Political Science 107; also C-L: Comparative Area Studies. One course. *McKean*

110. Economic Analysis for Public Policy Making: Microeconomic and Non-probabilistic Models. Application of microeconomic analysis to public policy areas, including agriculture, housing, taxation, and income redistribution. Prerequisite: Economics 52 or equivalent. One course. *Cook, Danzon, Lipscomb, or Shetty*

112. Statistics and Public Policy. Uses and limitations of statistical methods, including experimentation, for monitoring and evaluating public policies. Prerequisite: Public Policy Studies 55. One course. *McConahay or Shetty*

114. Political Analysis for Public Policy Making. Analysis of the political and organizational processes which influence the formulation and implementation of public policy. Alternative models. C-L: Political Science 145. One course. *Ascher or Entman*

116. Policy Choice as Value Conflict. Theoretical and practical problems in decision making in relation to conflicts of value and of interest. The manifestation of norms deriving from professional ethics, ideology, law, and other sources in such policy issues as welfare, environmental management, and national defense. One course. *Payne*

151S. Administration of Justice. Analysis of policy problems and conflicts involved in the operation of the criminal justice system. One course. *Cook*

152S. Administration of Justice, Summer Internship. Prerequisite: Public Policy Studies 151S. Pass/fail. Half course or one course. *Staff*

154S. Journalism and Public Policy. Policy problems and conflicts involved in applying First Amendment principles to print and electronic journalism. Topics include libel, obscenity, privacy, national security, fair trial, and antitrust. Prerequisite: consent of instructor. One course. *Entman*

155S. Journalism and Public Policy, Summer Internship. Prerequisite: Public Policy Studies 154S. Pass/fail. Half course or one course. *Staff*

157S. Health Policy. Analysis of health care problems and policies. One course. *Danzon or Lipscomb*

158S. Health Policy, Summer Internship. Prerequisite: Public Policy Studies 157S. Pass/fail. Half course or one course. *Staff*

159S. State and Local Public Policy. Causes of and alternative solutions to the problems of state and local governments, with emphasis on North Carolina. C-L: Economics 159S. One course. *Luger*

161S. State and Local Public Policy, Summer Internship. Prerequisite: Public Policy Studies 159S. Pass/fail. Half course or one course. *Staff*

163S. Telecommunications Policy and Regulation. Broadcast policies, the rise of cable television, spectrum allocation and authorization, and developments in common carrier telecommunications. One course. *Geller and staff*

164S. Telecommunications Policy and Regulation, Summer Internship. Prerequisite: Public Policy Studies 163S. Pass/fail. Half course or one course. *Staff*

166. Child Policy in the United States. Social, economic, and political dimensions of policies affecting children in America. One course. *Stack*

174. Technology Assessment and Social Choice. See C-L: Engineering 174; also C-L: Religion 174. One course. *Garg and McCollough*

175S. The Palestine Problem and United States Public Policy. Identification of Arab and Zionist perceptions, alternatives available to American decision makers, interest group pressures on United States policies, historical analysis as a means to improve public policy. C-L: Comparative Area Studies and History 159S. One course. *Kuniholm*

176S. American Communities: A Photographic Approach. A documentary approach to the study of American communities through individual photographic projects centered around a community of the student's choosing. Prerequisite: consent of instructor. C-L: Film. One course. *Harris*

178S. Visual Language and Policy Choice. History and significance of the documentary tradition, the differences between visual and verbal social observation and the ways photography can alter the analysis of social and policy problems. C-L: Film. One course. *Coles, Harris, and Payne*

180S. Writing for the Media. Workshop on writing news stories, editorials, and features for the print media. Prerequisite: consent of instructor. One course. *Green*

185. American Diplomacy from the Kennedy Administration to the Present. C-L: History 185. One course. *Kuniholm or C. Davis*

190. Internship. For students working in a public agency, political campaign, or other policy-oriented group under the supervision of a faculty member. Prerequisites: prior consent of Director of Internship Programs and Director of Undergraduate Studies. Pass/fail grading. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Up to two courses. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. Up to two courses. *Staff*

195S. Selected Public Policy Topics. One course. *Staff*

For Seniors and Graduates

204S. Ethics in Political Life. C-L: Political Science 204S. One course. *Spragens*

215S. Public Policies to Save Lives. Economic, political, legal, and ethical issues in governmental efforts to reduce mortality through various health and safety programs and regulations. One course. *Staff*

217. Microeconomics and Public Policy Making. Consumption and production theory, welfare economics, theories of collective choice, market structures and regulation, and nonmarket decision making. One course. *Clotfelter*

218. Macroeconomic Policy. Survey of macroeconomic theory and analysis of policies designed to reduce unemployment, stimulate economic growth, and stabilize prices. Conventional monetary and fiscal instruments, employment policies, and new policies designed to combat inflation. C-L: Economics 218. One course. *Luger*

219. The Politics of the Policy Process. The formulation of public policies, substantive policies in a variety of contexts from local government to international affairs;

the role of legislatures, interest groups, chief executives, and the bureaucracy in defining alternatives and in shaping policy from agenda formulation to implementation. Not open to students who have taken Public Policy Studies 114. C-L: Political Science 248. One course. *Staff*

221. Analytical Methods I: Decision Analysis for Public Policy Makers. Methods for structuring decision dilemmas and decomposing complex problems, assessing the probabilities of uncertain consequences of alternative decisions, appraising the decision maker's preferences for these consequences and for re-examining the decision. Not open to students who have taken Public Policy Studies 55. One course. *Behn or Lipscomb*

222. Analytical Methods II: Data Analysis for Public Policy Makers. Sampling theory, Bayesian statistics, and regression analysis. Examples from problems in health care, transportation, crime, urban affairs, and politics. Not open to students who have taken Public Policy Studies 112. One course. *McConahay*

223. Ethics and Policy Making. Normative concepts in politics, liberty, justice, and the public interest: historical and philosophical roots, relationship to one another and to American political tradition, and implications for domestic policy problems. C-L: Political Science 245. One course. *Price*

231. Analytical Methods III: Quantitative Policy Evaluation. Problems in quantifying policy target variables such as unemployment, crime, and poverty. Experimental and nonexperimental methods for evaluating the effect of public programs, including topics in experimental design, regression analysis, and simulation. Prerequisite: Public Policy Studies 222 or equivalent. One course. *McConahay*

232. Analytical Methods IV: Topics in Economic Policy. Cost benefit analysis of public programs. Public utility regulation, pollution regulation, hospital rate setting, regulation of product safety. Quantitative methods and microeconomic theory for analysis of both normative and positive aspects of economic policy. Prerequisites: Public Policy Studies 110 or 217 or Economics 149 and familiarity with regression analysis or concurrent enrollment in Public Policy Studies 231. C-L: Economics 232. One course. *Gillis*

236S, 237S. Public Management I and II: Managing Public Agencies. 236S: operations management, information and performance, personnel management, public sector marketing. 237S: organizational strategy, organizational structure and design, leadership and motivation, labor negotiations. Prerequisite for 237S: Public Policy Studies 236S. Two courses. *Behn and Yaggy*

238S. Public Budgeting and Financial Management. Fund accounting for government; techniques of financial analysis, including break-even analysis, cost accounting, cash-flow analysis, and capital budgeting; and governmental budgeting, including the budgetary process and reforms, and the budget crunch in the public sector. One course. *Behn or Stubbing*

240S. Analyzing the News. Research seminar on political messages and effects of media. Methods and findings of content analysis, survey research, critical theory, semiology; research project integrating these approaches. C-L: Political Science 208S. One course. *Entman*

241. Reporting the American People. Critical analysis of the sources of information the media rely upon in reporting opinion and policy preferences: opinion polls, bellwethers, informed elites. Includes the design and execution of a public opinion poll on a topic of local or national interest. One course. *McConahay*

242S. Comparative Law and Policy: Ethnic Group Relations. Various approaches to the reduction of conflict in deeply divided societies, primarily in Asia and Africa,

with secondary attention to Western countries. The nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. C-L: Comparative Area Studies, Law 572, and Political Science 242S. One course. *Horowitz*

250. Public Policy and the Arts. Democratic and aesthetic values in respect to past and present patterns of public support for the arts; for example, subsidies, tax policy, censorship, and the effect of public choices on standards of quality. One course. *Payne*

254. Transportation Planning and Policy Analysis. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. C-L: Civil and Environmental Engineering 216. One course. *Pas*

257. United States Policy in the Middle East. From World War II to the present with a focus on current policy options. C-L: Comparative Area Studies. One course. *Kuniholm*

264S. Research Seminar: Topics in Public Policy I. Selected topics. One course. *Staff*

267S. Policy Making in International Organizations. Emphasis on international financial institutions such as the World Bank and the International Monetary Fund. C-L: Comparative Area Studies and Political Science 267S. One course. *Ascher*

268. Federal Tax Policy. Structure, incidence, and economic effects of major federal taxes. Special attention to problems of inflation, income definition, distortions, savings, and investment. C-L: Economics 268 and Law 518. One course. *Clotfelter or Schmalbeck*

270S. Humanistic Perspectives on Public Policy. Modes of inquiry into aspects of social life important to policy makers but beyond the normal reach of social science. Reading from James Agee, Robert Coles, Eudora Welty, James Baldwin, George Eliot, and others. Prerequisite: consent of instructor. One course. *Coles and Payne*

272. Resource Economics and Policy. C-L: Forestry and Environmental Studies 270. One course. *Hyde*

278. Human Service Bureaucracies. Schools, prisons, courts, welfare agencies: decision making, implementation, the impact of work practices on clients. The future of street-level bureaucracy. One course. *Stack*

283S. Congressional Policy Making. C-L: Political Science 283S. One course. *Price*

284S. Public Policy Process in Developing Countries. Policy-making patterns in less developed countries; examples from Latin America, Africa, and Asia. C-L: Comparative Area Studies and Political Science 284S. One course. *Ascher*

286S. Economic Policy Making in Developing Countries. Fiscal, monetary, and exchange rate policies in less developed countries; issues in public policy toward natural resources and state-owned enterprises. Prerequisites: Public Policy Studies 110 or Economics 149, or consent of instructor. C-L: Comparative Area Studies and Economics 286S. One course. *Gillis*

290. Glasgow Seminar in Public Policy. The large theoretical problems of public policy (e.g., justice, equality, liberty); the making and implementation of policy in specific areas (e.g., economic, urban, social); comparative analysis of Europe's communist countries and how their political systems differ from those of the United States and Britain. Prerequisites: Public Policy Studies 55, 110, 112, 114, 116, and permission

of the Director of Undergraduate Studies (who may waive requirements in exceptional circumstances). (Taught in Scotland.) One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

186S. Shaping the News

256. The Economics of Health Care

INTERNSHIP COURSES

The internship courses provide students with an opportunity to develop a basic understanding of one or more public policy areas, to apply that understanding in a job during the summer, and to return to the classroom to build on this knowledge and experience. Normally, students take a two-course sequence to receive credit for the field experience requirement of all public policy studies majors. Prior to participation in the internship program, all majors must have completed Public Policy Studies 55 and three of the four core courses (Public Policy Studies 110, 112, 114, or 116). This requirement may be waived by the Director of Undergraduate Studies for transfer students or others in unusual circumstances. Applications for enrollment in the internship program must be completed in the early fall through the Director of Internship Programs. Stipends are usually provided for all public policy majors enrolled in one of the following internship courses: Public Policy Studies 152S, 155S, 158S, 161S, or 164S.

All majors are encouraged to take an advanced follow-up course in the area of their summer internship.

THE MAJOR

The policy studies major is an interdisciplinary social science program designed to provide students with the skills, analytical perspectives, and descriptive information needed by policy analysts to deal effectively with major contemporary social problems. The course of study familiarizes the student with the kind of contribution each of several disciplines (political science, economics, social psychology, applied mathematics, history, and ethics) can make to policy analysis. Opportunities are provided, both in the classroom and through field experiences, for students to integrate this material and apply it to analyzing specific public policy issues.

Students majoring in public policy participate in a variety of learning experiences including seminars, lecture and discussion classes, individual study, policy workshops, and an internship. In addition, students are urged to participate actively in programs sponsored by the Institute of Policy Sciences and Public Affairs to supplement material covered in class. As a matter of policy, students are asked to evaluate teaching and course content and are provided both formal and informal opportunities to shape the program and curriculum.

Prerequisites. Economics 2 or 52, Political Science 91, and Public Policy Studies 55.

Major Requirements. Public Policy Studies 110, 112, 114, 116, plus three additional courses, one of which must be a 200-level course. A policy-oriented field experience approved by the Director of Undergraduate Studies is required. (See Internship Courses above.)

Religion (REL)

Associate Professor Bland, *Chairman*; Professor Kort, *Director of Undergraduate Studies*; Professors Bradley, Clark, Lawrence, Lincoln, Long, Osborn, E. Meyers, Poteat, and Wintermute; Associate Professors Corless, McCollough, C. Meyers, Partin, and Peters; Assistant Professor Robinson; Adjunct Professor Sasson; Lecturer Shows

Study in the Department of Religion arises from and leads to the awareness that an understanding of religion is crucial to an understanding of persons and of human societies. The curriculum develops this understanding in two distinct but inseparable ways: first, through the examination of the particulars of specific religious traditions; and, second, through theoretical studies of an analytic, comparative, and constructive nature.

Introductory courses (Religion 50, 51, 52, 53, 54, 55, 56, 57, 58, and 59) are open to all undergraduates. These courses also help fulfill distributional field requirements for the religion major. Courses at the 100 level are open to all undergraduates with the exception of those specially designated. Courses at the 200 level are open to upperclassmen with the consent of the instructor.

50. The Old Testament. Historical, literary, and theological investigations. C-L: Judaic Studies. One course. *C. Meyers, E. Meyers, Peters, or Wintermute*

51. Introduction to Judaic Civilization. Continuity and change in the major periods of Judaism. C-L: Comparative Area Studies and Judaic Studies. One course. *Bland or E. Meyers*

52. The New Testament. Origins, development, and content of thought. One course. *Staff*

52D. The New Testament. Same as Religion 52 with discussion section included. One course. *Staff*

53. The Roman Catholic Tradition. A survey of the development of Roman Catholic theology and institutions from the second century to Vatican II. One course. *Clark*

54. Protestant Traditions. A survey of the historical development of Protestant theologies and denominations. One course. *Clark*

55. Biblical Literature. A study of selected Old Testament and New Testament texts, their cultural context, and the relation within them of religious meaning to literary form. One course. *Staff*

56. The Black Religious Experience in America. From the slave period to the present. C-L: Afro-American Studies 56. One course. *Lincoln*

57. Introduction to Religions of Asia. Problems and methods in the study of religion, followed by a survey of the historical development, beliefs, practices, and contemporary significance of the Islamic religion and religions of south and east Asia. C-L: Comparative Area Studies. One course. *Bradley, Corless, Lawrence, Partin, or Robinson*

58. Interpretations of Religion in Western Culture. Western religion as explained by contemporary sociologists, psychologists, anthropologists, and theologians. One course. *Bland or Potat*

59. An Introduction to Christian Theology and Ethics. Analysis and interpretation of faith and practice. One course. *Kort, McCollough, or Osborn*

60. Ethical Issues in Twentieth-Century America. A critical examination of ethical themes, with special emphasis on public policy. For participants in the Twentieth-Century America Semester only. One course. *McCollough*

71A, 72A. Freshman-Sophomore Seminars: African and Asian Traditions. Topics and instructors to be announced. C-L: Comparative Area Studies. Two courses. *Staff*

71C, 72C. Freshman-Sophomore Seminars: Analytic, Comparative, and Constructive Studies. Topics and instructors to be announced. Two courses. *Staff*

- 100. Selected Studies in the Bible: Pentateuch.** Analysis and interpretation of major themes and figures, with special consideration of the narratives dealing with human and Israelite origins. C-L: Judaic Studies. One course. *Staff*
- 101. Selected Studies in the Bible: Prophets.** Analysis and interpretation of representative issues and personalities in the historical and prophetic books. C-L: Judaic Studies. One course. *Staff*
- 102. Selected Studies in the Bible: Writings.** Analysis and interpretation of representative forms and ideas, with particular attention to wisdom literature and psalms. C-L: Judaic Studies. One course. *Staff*
- 105. Theology of the Old Testament.** Emphasis upon history and eschatology, covenant, messianism, and wisdom. C-L: Judaic Studies. One course. *Wintermute*
- 106. Jesus and the Synoptic Gospels.** The gospel tradition in the New Testament. One course. *Staff*
- 107. Theology of the New Testament.** A systematic analysis of the theologies of the New Testament writers and an attempt to synthesize the basic and shared themes. One course. *Staff*
- 108. The Life and Letters of Paul.** Paul's role in the expansion of the Christian movement, the most important aspects of his thought, and his continuing influence. One course. *Staff*
- 109. Women in the Biblical Tradition: Image and Role.** C-L: Judaic Studies and Women's Studies. One course. *C. Meyers*
- 110. Archaeology and Art of the Biblical World.** The material culture of ancient Palestine as it relates to the Hebrew Bible, the New Testament, and early Judaism. C-L: Comparative Area Studies and Judaic Studies. One course. *C. Meyers or E. Meyers*
- 111. The Historical Jesus.** Historical research on the life of Jesus. One course. *Staff*
- 115-116. Introduction to Biblical Hebrew.** (Divinity School courses open to undergraduates with permission of the instructor.) Elements of phonology, morphology, and syntax. Exercises in reading and writing Hebrew. 116: study of the weak verb; exegetical treatment of the Book of Jonah. C-L: Judaic Studies. Two courses. *Bailey*
- 123. Issues in Early Christian History.** Theological, ecclesiastical, moral, and social issues in second- to fifth-century Christianity. Prerequisite: Religion 52 or 53 or 54 or 125 or consent of instructor. One course. *Clark*
- 124. Christianity in the United States.** Leaders and issues in representative movements and institutions. One course. *Staff*
- 125. Women and Sexuality in the Christian Tradition.** A historical survey of Christian attitudes and practices from New Testament times to the present. C-L: Women's Studies. One course. *Clark*
- 128. The Background of Contemporary Christian Thought: 1918-1960.** Theology of Karl Barth, Rudolf Bultmann, Paul Tillich, Karl Rahner, Reinhold Niebuhr, and others. One course. *Osborn*
- 129. Contemporary Christian Faith and Politics.** One course. *Osborn*
- 131D. Principles of Archaeological Investigation.** Supervised field work, visits to other excavations, introduction to ceramic chronology, numismatics, and other related disciplines. Excavation of a late Roman village in Galilee. Offered in Israel, only in the summer. C-L: Judaic Studies. One course. *C. Meyers or E. Meyers*

- 132D. Palestine in Late Antiquity.** The history, literature, and archaeology of Roman Palestine with particular emphasis on Galilee in rabbinic and early Christian times. C-L: Comparative Area Studies and Judaic Studies. One course. *E. Meyers*
- 133. The Foundations of Post-Biblical Judaism.** History, religion, and literature of Pharasaic and sectarian Judaism from the time of Ezra to Rabbi Judah. C-L: Comparative Area Studies and Judaic Studies. One course. *E. Meyers*
- 134. Jewish Mysticism.** The main historical stages, personalities, texts, and doctrines from rabbinic to modern times. C-L: Comparative Area Studies, Judaic Studies, and Medieval and Renaissance Studies. One course. *Bland*
- 135. Jewish Religious Thought.** Doctrines, dialectics, and religious attitudes of pre-Enlightenment theologians. C-L: Comparative Area Studies, Judaic Studies, and Medieval and Renaissance Studies. One course. *Bland*
- 136. Contemporary Jewish Thought.** Modern Jewish thought from Mendelssohn to the present, with particular reference to American thinkers. C-L: Comparative Area Studies and Judaic Studies. One course. *Bland or E. Meyers*
- 138. Political Leadership in the Black Church.** Turner, Powell, King, Malcolm X, and others. C-L: Afro-American Studies 138. One course. *Lincoln*
- 140. Religions of India.** Major religious traditions of the subcontinent: Hinduism, Buddhism, Jainism, and Islam. C-L: Comparative Area Studies. One course. *Bradley or Lawrence*
- 141. Religions of China and Japan.** Traditional religion in China and Japan and its interaction with Sino-Japanese Buddhism. C-L: Comparative Area Studies. One course. *Corless*
- 142. Comparative Mythology.** Nature and functions of religious myth in Judaism, Christianity, Islam, Hinduism, and Buddhism. C-L: Comparative Area Studies. One course. *Partin*
- 143. Mysticism.** The mystical element of religion: Hinduism, Buddhism, Christianity, and Islam. C-L: Comparative Area Studies. One course. *Bradley*
- 144. Black Cults and Sects in America.** Cult-sect phenomena. C-L: Afro-American Studies 144. One course. *Lincoln*
- 145. Social Issues in Contemporary Hinduism.** Emphasis on the caste system and reactions to it; topics include untouchability, religious roles of women, and institutional responses to famines and epidemics. C-L: Comparative Area Studies. One course. *Robinson*
- 147. Muhammad and the Qur'ān.** The Qur'ān in relation to the religious experience, life, and work of Muhammad. C-L: Comparative Area Studies. One course. *Partin*
- 148. Modern American Religious Cults.** Children of God, Unification Church, Scientology, Feraferia, Transcendental Meditation, Krishna Consciousness, Bahai, and others. One course. *Partin*
- 149. Buddha and Buddhism.** A systematic introduction to the origins and spread of Buddhist thought and practice. C-L: Comparative Area Studies. One course. *Corless*
- 151. Ethical Issues in Social Change and Public Policy.** American moral tradition and factors in social change in the normative analysis of public policy, with a consideration of specific ethical issues. One course. *McCollough*
- 152. Islamic Mysticism.** Sufism as an ascetical protest movement that affected the worldwide growth of Islam. C-L: Comparative Area Studies. One course. *Lawrence*

155. Ethical Issues in the Life Cycle. Human development viewed in religious, ethical, and psychological perspectives. One course. *McCollough*

156. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, and Sociology 175. One course. *Staff*

157. Bioethics in Comparative Contexts. Ethical approaches to health and illness from moral, religious, and philosophical perspectives in relation to economic, social, and political factors. One course. *McCollough*

158. Psychology and Religion. Contributions of major psychological theories to an understanding of religion, especially Christianity. One course. *Shows*

159. Ethical Issues in Health Care. A theological and comparative study of selected ethical issues in health policy: the profession of medicine, institutional organization and services, and medical practice. One course. *McCollough*

160, 161. Introduction to the Civilizations of Southern Asia. See C-L: Interdisciplinary Courses 101, 102; also C-L: Anthropology 101, 102, Comparative Area Studies, and History 193, 194. Two courses. *Lawrence and staff*

162, 163. Introduction to Islamic Civilization. See C-L: Interdisciplinary Courses 162, 163; also C-L: Anthropology 147, 148, Comparative Area Studies, History 101G, 102G, and, for 162, Medieval and Renaissance Studies. Two courses. *Lawrence and staff*

170. Problems of Religious Thought. Analysis of uses of *know, true, mind, body, time, person, love, meaning*, in modern Western culture as introduction to religious reflection. One course. *Poteat*

172. Religion and Tragedy. Influence of the Judaic-Christian religious tradition on the development of the tragic view of life. One course. *Poteat*

174. Technology Assessment and Social Choice. See C-L: Engineering 174; also C-L: Public Policy Studies 174. One course. *Garg and McCollough*

188. Recent Literature and Its Religious Implications. Religious elements in recent literature. One course. *Kort*

191, 192. Independent Study. For freshmen and sophomores with departmental approval. Two courses. *Staff*

193, 194. Independent Study. For juniors and seniors with departmental approval. Two courses. *Staff*

195A, 196A. Junior-Senior Seminars: African and Asian Traditions. Topics and instructors to be announced. C-L: Comparative Area Studies. Two courses. *Staff*

195B, 196B. Junior-Senior Seminars: Jewish and Christian Traditions. Topics and instructors to be announced. C-L: Judaic Studies. Two courses. *Staff*

195C, 196C. Junior-Senior Seminars: Analytic, Comparative, and Constructive Studies. Topics and instructors to be announced. C-L: Comparative Area Studies. Two courses. *Staff*

197-198. Honors Research. Consent of the Director of Undergraduate Studies required. Two courses. *Staff*

For Seniors and Graduates

207, 208. Intermediate Biblical Hebrew. Grammar with reading and exegesis of Old Testament prose and poetry. C-L: Old Testament 207, 208 in the Divinity School;

and Judaic Studies. Prerequisite: at least one year of Hebrew or consent of instructor. Two courses. *Staff*

212. Policy Making and Theological Ethics. Relation of knowledge, power, and values in policy making; models of decision making in the policy sciences and their ethical implications. One course. *McCollough*

217. Islam in India. History and thought of major Indian Muslims from Biruni to Wali-Ullah, with special attention to the role of Sufism. An introduction to selected Muslim scholars and saints who contributed to the interaction between Islam and Hinduism in Northern India during the second millenium A.D. C-L: Comparative Area Studies. One course. *Lawrence*

218. Religion in Japan. A survey of religion in Japan, with specific emphasis on indigenization and attempts at synthesis. An approach to the meaning of the words *religious* and *secular* in the Japanese situation. C-L: Comparative Area Studies. One course. *Corless*

220. Rabbinic Hebrew. Interpretive study of late Hebrew, with readings from the Mishnah and Jewish liturgy. C-L: Judaic Studies. One course. *E. Meyers or staff*

221. Readings in Hebrew Biblical Commentaries. Selected Hebrew texts in Mid-rash Aggadah and other Hebrew commentaries reflecting major trends of classical Jewish exegesis. C-L: Judaic Studies. One course. *Bland*

226B. Exegesis of the Greek New Testament (Romans). Prerequisite: consent of instructor. One course. *Staff*

226F. Exegesis of the Greek New Testament (I and II Corinthians). Prerequisite: consent of instructor. One course. *Staff*

230S. The Meaning of Religious Language. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. Prerequisite: consent of instructor. C-L: Philosophy 230S. One course. *Poteat*

231S. Seminar in Religion and Contemporary Thought. Analytical reading and discussion of such critical cultural analysis as is found in the works of Polanyi, Arendt, Trilling, and others, with appraisal of the relevance of theological inquiry. One course. *Poteat*

232S. Religion and Literature. Theories concerning the relation of religion to literary forms, particularly narrative. One course. *Kort*

233. Modern Narratives and Religious Meanings. A study of kinds of religious meaning or significance in representative American, British, and continental fiction of the first half of the twentieth century. One course. *Kort*

234. Early Christian Asceticism. The development of asceticism and monasticism in the first six centuries of Christianity. C-L: Women's Studies. One course. *Clark*

235. Heresy: Theological and Social Dimensions of Early Christian Dissent. One course. *Clark*

238. Jewish Responses to Christianity. Apologetic and polemical themes in rabbinic, medieval, and contemporary writings. C-L: Judaic Studies. One course. *Bland*

239. Introduction to Middle Egyptian I. Grammar and readings in hieroglyphic texts relating to the Old Testament. One course. *Wintermute*

240. Introduction to Middle Egyptian II. Readings in Middle Egyptian and introduction to New Egyptian Grammar. Prerequisite: Religion 239. One course. *Wintermute*

243. Archaeology of Palestine in Biblical Times. Investigation of selected material remains from the Bronze Age to the Persian period. Trends in biblical studies, with particular attention to methodological considerations and current developments. C-L: Comparative Area Studies. One course. *C. Meyers*

244. The Archaeology of Palestine in Hellenistic-Roman Times. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish Art. C-L: Comparative Area Studies and Judaic Studies. One course. *C. Meyers or E. Meyers*

248. Theology of Karl Barth. A historical and critical study of Barth's theology. One course. *Osborn*

258. Coptic. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: one year of Greek or consent of instructor. One course. *Wintermute*

264. The Sociology of the Black Church. An effort to identify, define, describe, and interpret the black church. One course. *Lincoln*

265. Religions of the West Africa Diaspora. Religious development of Africans displaced to the Western Hemisphere by slavery. C-L: Afro-American Studies and Comparative Area Studies. One course. *Lincoln*

280. The History of Religions. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. One course. *Partin*

281. Phenomenology and Religion. The writing of Scheler, E. Strauss, Merleau-Ponty, Ricoeur, Binswanger, or others; their bearing upon religious knowledge and practice. Prerequisite: consent of instructor. One course. *Poteat*

282. Myth and Ritual. Myths, rites, and symbols as modes of religious expression. Interpretation of symbolic configurations of kingship, initiation, sacrifice, and pilgrimage in diverse cultural contexts. One course. *Robinson and staff*

283. Islam and Modernism. Cultural, religious, and ideological forces which shape Muslim responses to modernism. C-L: Comparative Area Studies. One course. *Lawrence*

284. The Religion and History of Islam. Origins and development of the Islamic community and tradition, with particular attention to the religious element. C-L: Comparative Area Studies. One course. *Partin*

285. Introduction to the History of Religions. The history, symbols, rites, and structures of the manifestations of the sacred in the major religious traditions of the world. One course. *Staff*

287. The Scriptures of Asia. Translations of basic texts from the religious traditions of India, China, and Japan. C-L: Comparative Area Studies. One course. *Bradley*

288. Buddhist Thought and Practice. A historical introduction to Buddhist thought and practice, with special attention to their interrelationship in the living religion. C-L: Comparative Area Studies. One course. *Corless*

COURSES CURRENTLY UNSCHEDULED

71B, 72B. Freshman-Sophomore Seminars: Jewish and Christian Traditions

99. Perspectives in Archaeology

120. History of the Christian Church

127. Early Christian Culture: Evidence of Art and Literature

139. Modern Hebrew

166. The Professions and Society

228. Twentieth-Century Continental Theology

RELIGION COURSES BY FIELDS

Introductory Courses. Religion 50, 51, 52, 52D, 53, 54, 55, 56, 57, 58, 59, 60.

African and Asian Religions. Religion 57, 71A, 72A, 140, 141, 145, 149, 152, 160, 161, 162, 163, 195A, 196A, 217, 255, 265, 283, 284, 285, 287.

Jewish and Christian Traditions. Religion 50, 51, 52, 52D, 55, 71B, 72B, 100, 101, 102, 105, 106, 107, 108, 109, 111, 115-116, 123, 124, 125, 127, 128, 129, 131D, 132D, 134, 135, 139, 195B, 196B, 207, 208, 220, 221, 226B, 228, 239, 243, 248, 258.

Analytic, Comparative, and Constructive Studies. Religion 56, 58, 59, 60, 71C, 72C, 99, 138, 142, 143, 144, 148, 151, 155, 156, 158, 166, 170, 172, 174, 188, 195C, 196C, 212, 233, 238, 264, 280.

THE MAJOR

Major Requirements. Eight courses, which must include at least two introductory courses (numbered 50 through 60). The distribution of courses must also include at least one each from the categories African and Asian traditions; Jewish and Christian traditions; and analytic, comparative, and constructive studies. One of the eight courses must be a junior-senior seminar or a 200-level course.

The student, in consultation with an assigned adviser and with the adviser's approval, should elect four of the eight courses in such a way that they constitute a thematic or methodological concentration on a particular aspect of religion.

To prepare for graduate or professional study of religion, the department recommends that students complete at least four courses in college level study, or the equivalent, of a foreign language. Master of Arts and Doctor of Philosophy programs often require examination in one or two foreign languages. Students planning to attend a theological seminary should note that knowledge of biblical languages, as well as Latin, frequently is presupposed or required. Those planning to pursue studies of Asian religions should begin appropriate language study as part of their undergraduate preparation.

Honors. The department offers work leading to graduation with distinction. For further information consult the Director of Undergraduate Studies and the section on honors in this bulletin.

Romance Languages (RL)

Professor Stewart, *Chairman*; Professor Cordle, *Director of Undergraduate Studies*; Professors Fein, Osuna, Tetel, and Wardropper; Associate Professors Bryan, Caserta, Garci-Gómez, Hull, Orr, Pérez, Ripley, and Thomas; Assistant Professor Bell; Professors Emeriti N. Dow, Fowlie, Jordan, and Predmore; Associate Professor Emeritus Vincent; Assistant Professors Emeriti Barlow, M. T. Dow, and Miller; Instructors Ross and Wheeler; Visiting Lecturers Guerin and Zanger

French and Spanish 74, 76 or equivalents are the prerequisites for all courses not taught in English. Students who by reason of foreign residence have had special opportunities in French or Spanish must be classified by the Director of Undergraduate Studies.

The intensive language courses 181 and 182 provide an introduction to the language. They are recommended for students who wish to acquire proficiency in a second foreign language before entering graduate school.

In literature, one credit is granted for a score of 3 or 4 and two credits for a score of 5 (French or Spanish 70, 71) on the examination of the advanced placement pro-

gram. In language, one advanced placement credit (French or Spanish 76) is granted for scores of 3, 4, and 5.

FRENCH (FR)

1-2. Elementary French. Understanding, speaking, reading, and writing French. Language laboratory for recording-listening practice. Two courses. *Staff*

12. Review of Elementary French. Intensive review of first-year French. Satisfies the foreign language requirement; open only to students with a placement or achievement score of 380-440. One course. *Staff*

63. Intermediate French. Grammar review, reading, and oral practice, including laboratory experience. One course. *Staff*

70, 71. These numbers represent one or two course credits for advanced placement in literature.

74. Intermediate Readings in Modern French. Readings, discussion, composition, listening practice. One course. *Staff*

76. French Conversation. Practice in speaking and writing everyday French based on contemporary readings. Prerequisite: French 63 or equivalent. One course. *Staff*

101, 102. Introduction to French Literature. An introduction to the major writers of the French literary tradition. Selections and complete works of poetry, fiction, theater, and essay. 101: Middle Ages through the eighteenth century. 102: nineteenth and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in French. Two courses. *Staff*

103S, 104S. Discussions of Readings. Selected topics. Open only to freshmen and sophomores. Two courses. *Staff*

107S. Contemporary Ideas. Readings and discussion of French works which have provoked political or intellectual thought in recent years. For freshmen and sophomores only. C-L: Comparative Area Studies. One course. *Staff*

110. Advanced Grammar and Composition. A systematic study of the structure of formal French. Practice in writing. One course. *Bryan or Hull*

111S. French for Current Affairs. Problems and controversies in today's France. Readings, discussions, and exposés. One course. *Bryan and staff*

112S. Special Topics in Advanced Language. Intensive work on the vocabulary and usage of a specialized field. Readings, discussions, and exposés. One course. *Staff*

113S. French for Business and Law. An introduction to French commercial and legal practices and vocabulary. One course. *Bryan*

114. Language and Civilization of Quebec. Offered only as part of summer program in Montreal. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

117. French Phonetics. Sounds, rhythm, intonation. Individual practice in language laboratory. Readings in phonetic theory. One course. *Hull*

118. Advanced Translation and Stylistics. Differences between French and English patterns of expression. Levels of usage. Practice in translation. Prerequisite: French 110 or equivalent or consent of instructor. One course. *Hull or Thomas*

122. The French Film. Style and ideology in masterpieces of the French cinema from the silent era, the poetic realism of the 1930s, the *Nouvelle Vague*, and the 1980s. Taught in English. C-L: Film. One course. *Staff*

131S. French in the New World. French and Creole in Canada, New England, Louisiana, and the Caribbean. Origins, history, linguistic characteristics, current political and social issues. C-L: Canadian Studies, Comparative Area Studies, and Linguistics. One course. *Hull*

132. Literature and History of Quebec. Offered only as part of summer program in Montreal. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

136S. Life in Eighteenth-Century France. A course based on period documents—books, memoirs, newspapers, scandal sheets—designed to give a picture of life in a large French city before the modern era. C-L: Comparative Area Studies. One course. *Stewart*

137. Aspects of Contemporary French Culture. Offered only as part of summer program in Paris. One course. *Staff*

139. French Civilization. The institutions and culture of France from the Middle Ages to the present. Readings and discussions in French. C-L: Comparative Area Studies. One course. *Tetel*

141S, 142S. French Literature. Topics to be announced. Open to juniors and seniors. Two courses. *Staff*

145S. Topics in Renaissance Literature and Culture. Topics may include: women writers, love and self-knowledge, carnival and the grotesque, in search of Rome, text as political and religious pamphlet. C-L: Medieval and Renaissance Studies. One course. *Tetel*

146S. Montaigne and Self-Portraiture. A reading of some *essais* in the light of the self-portrait in Renaissance art. C-L: Medieval and Renaissance Studies. One course. *Tetel*

147. The Roots of Modernity in Seventeenth-Century Literature. Analysis of form and thought in selected works of Descartes, La Fontaine, Madame de Lafayette, Pascal, La Rochefoucauld, and La Bruyère. Emphasis on the innovations and lasting influence of each author. One course. *Staff*

148. French Drama of the Seventeenth Century. The plays of Corneille, Racine, and Molière are read in conjunction with several twentieth-century works to explore dramatic conventions and the difference between tragedy and comedy. C-L: Medieval and Renaissance Studies. One course. *Staff*

151. French Comedy. The theatrical tradition of comedy and its evolution, with emphasis on Molière, Marivaux, and Beaumarchais, and other readings from *Pathelin* to Ionesco. C-L: Drama 152. One course. *Stewart*

152. The Early French Novel. Origins and evolution of the novel in the seventeenth and eighteenth centuries: Madame de Lafayette, Marivaux, Prévost, Rousseau, Diderot, Laclos, Sade. One course. *Stewart*

153. The French Enlightenment. Religion, politics, and philosophic and literary ideas of eighteenth-century France: Montesquieu, Voltaire, Rousseau, and others. One course. *Stewart*

155. Romanticism in French Literature. Romantic theory and practice; including Constant, Chateaubriand, Lamartine, Hugo, Musset, Vigny, and Nerval. One course. *Orr*

156. The Age of the Novel. Flaubert, Balzac, and Stendhal. One course. *Bell or Orr*

158. Toward Modernism in French Poetry. An introduction to modern trends in the nineteenth century; emergence from traditional romanticism; art for art's sake and

Parnassians (Gautier, Leconte de Lisle); the transition from decadence to symbolism (Baudelaire, Verlaine, Rimbaud, and Mallarmé). One course. *Thomas*

159. Feminist Fiction. Works by women in the modern period, including George Sand, Colette, Simone de Beauvoir, and others. C-L: Women's Studies. One course. *Orr*

162. French Drama of the Twentieth Century. A survey of literature for the stage from 1890 to the present. One play each of Claudel, Maeterlinck, Jarry, Giraudoux, Cocteau, Ghelderode, Anouilh, Montherlant, Sartre, Camus, Genet, Ionesco, Beckett, Pinget, Vian, and Arrabal. C-L: Drama 154S. One course. *Cordle*

163. French Poetry of the Twentieth Century. The symbolist heritage and surrealism: Mallarmé, Apollinaire, Breton, Eluard, Tzara, and others. One course. *Thomas*

166, 167. Contemporary French Life and Thought. Major writers of the twentieth century and their historical and cultural circumstances. 166: Claudel, Gide, Valéry, Proust, Apollinaire, Mauriac, Alain-Fournier, Cocteau. 167: Giono, Breton, Aragon, Malraux, Sartre, Beckett, Camus, Robbe-Grillet, Sarraute. C-L: Comparative Area Studies. Two courses. *Cordle*

169. The Contemporary Novel in French Canada. Major trends in the novel since World War II: social revolt, proletarianism, political and religious liberation, and rejection of the past. C-L: Canadian Studies and Comparative Area Studies. One course. *Tetel*

181. Intensive French. An introduction to the language. Prerequisites: four semesters of another foreign language or consent of instructor. One course. *Staff*

182. Intensive French. Readings in modern literature: analysis and discussion. Prerequisite: French 181 or consent of instructor. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

210. The Structure of French. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. C-L: Linguistics. One course. *Hull*

211. History of the French Language. The evolution of French from Latin to its present form; internal developments and external influences. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Hull*

223. Semiotics for Literature. Theoretical writings in general semiotics by Frege, Peirce, Saussure, Mukarovsky, and Morris and their applications for textual analysis of French literary works by representative contemporary critics such as Eco, Riffaterre, Corti, and Greimas. Taught in English. One course. *Thomas*

248. French Literature of the Seventeenth Century. The baroque and the classical: form and meaning in the plays of Corneille, Racine, and Molière. Readings in baroque and précieux poetry. C-L: Medieval and Renaissance Studies. One course. *Staff*

251, 252. Literature of the Eighteenth Century. Problems of literary history, critical reading, and interpretation, focused on varying topics. Two courses. *Stewart*

256. Modern Literature and History. The problems of history, society, and politics in literature, through the writings of Rousseau, Tocqueville, Michelet, Flaubert, Hugo,

Merleau-Ponty, Foucault, and others. C-L: Comparative Area Studies. One course. *Orr*

257, 258. The Nineteenth-Century French Novel. 257: romanticism and romantic realism, studied especially in the works of Chateaubriand, Stendhal, and Balzac. 258: realism and naturalism, with special emphasis on Flaubert and Zola. Two courses. *Bell or Orr*

261. French Symbolism. Poetry and theories of Baudelaire, Mallarmé, and Rimbaud. Decadence: Lautréamont and Laforgue. One course. *Orr or Thomas*

265, 266. French Literature of the Twentieth Century. 265: to 1935, emphasis on Gide, Mauriac, and Malraux. 266: after 1935, emphasis on Sartre, Camus, and the *nouveau roman*. Two courses. *Cordle*

290S. Studies in a Contemporary Figure. A writer, philosopher, critic, or artist. One course. *Staff*

Courses Currently Unscheduled

170. Film and the French Novel

255. French Preromantic and Romantic Poetry

263. Contemporary French Theater

ITALIAN (IT)

1-2. Elementary Italian. Understanding, speaking, reading, and writing Italian. Language laboratory available for recording-listening practice. Two courses. *Caserta and staff*

63. Intermediate Italian. Grammar review; reading; oral practice, including laboratory experience. One course. *Caserta and staff*

111. Spoken Italian. Intensive instruction in Italian using selected topics and readings to build vocabulary and to provide practice in structural patterns. One course. *Caserta*

137. The Italian Cinema. Italian historical and social scene from 1945 to 1978 from cinema viewings and discussions. Neorealism, realism, and director's perspectives. C-L: Film. One course. *Staff*

181. Intensive Italian. An introduction to the language. Prerequisites: four semesters of another foreign language or consent of instructor. One course. *Caserta*

182. Intensive Italian. Readings in modern literature: analysis and discussion. Prerequisite: Italian 181 or consent of instructor. One course. *Caserta*

183, 184. Readings in Italian Literature. Historical and critical analysis. 183: Dante, Petrarch, Boccaccio, and the humanists. 184: Foscolo, Manzoni, Leopardi, and Verga. Conducted in Italian. C-L, 183: Medieval and Renaissance Studies. Two courses. *Caserta*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and of Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

283. Italian Novel of the Novecento. Representative novelists from Svevo to the most recent writers. One course. *Caserta*

284, 285. Dante. 284: *La Vita Nuova* and a close reading of the *Inferno*. 285: The *Purgatorio* and the *Paradiso* in the light of Dante's cultural world. Special attention will be given to the poetic significance of the *Commedia*. Conducted in English. Reading in Italian or English. Prerequisite for 285: Italian 284 or equivalent. C-L: Medieval and Renaissance Studies. Two courses. *Caserta*

Courses Currently Unscheduled

139. Modern Italy

PORTUGUESE (PTG)

181. Brazilian Portuguese. An intensive introduction to the language. Prerequisites: four semesters of another foreign language or consent of instructor. C-L: Comparative Area Studies. One course. *Wheeler*

182. Contemporary Brazilian Theater. Authors studied include Jorge Andrade, Ariano Suassuna, and Dias Gomes. Prerequisite: Portuguese 181 or consent of instructor. C-L: Comparative Area Studies. One course. *Wheeler*

Courses Currently Unscheduled

185, 186. Conversation

191, 192. Independent Study

193, 194. Independent Study

SPANISH (SP)

1-2. Elementary Spanish. Understanding, speaking, reading, and writing Spanish. Language laboratory available for recording-listening practice. Two courses. *Staff*

12. Review of Elementary Spanish. Intensive review of first-year Spanish. Satisfies the foreign language requirement; open only to students with a placement or achievement score of 430-490. One course. *Staff*

14. Intensive Elementary Spanish. Offered only in the Duke-in-Spain program. Two courses. *Staff*

63. Intermediate Spanish. Grammar review; reading; oral practice, including laboratory experience. One course. *Staff*

70, 71. These numbers represent one or two course credits for advanced placement in literature.

76. Spanish Conversation. Practice in speaking and writing everyday Spanish based on contemporary readings. Prerequisite: Spanish 63 or equivalent. One course. *Staff*

101, 102. Introduction to Literature. Major writers of the Spanish literary tradition. Poetry, fiction, theater, and essay. 101: Middle Ages through the seventeenth century. 102: eighteenth, nineteenth, and twentieth centuries. Two courses. 101: *Garci-Gómez and staff*; 102: *Osuna and staff*

103S, 104S. Discussion of Readings. Selected topics. Open only to freshmen and sophomores. Two courses. *Staff*

105, 106. Introduction to Spanish-American Literature. A survey of major writers and movements from the period of discovery to the present day. 105: the periods of conquest, colonial rule, and early independence. Includes works by native Indian,

mestizo, and women writers. 106: from *Modernismo* to the contemporary period. C-L: Comparative Area Studies. Two courses. 105: Ross; 106: Fein

107S. Spanish-American Short Fiction. Novelettes and short stories of the twentieth century: Borges, Cortázar, Denevi, Donoso, García Márquez, and others. C-L: Comparative Area Studies. One course. Fein

108S. Spanish Traditional Poetry. The Spanish *Romancero*; ballads and other forms of popular poetry. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. Garci-Gómez

109S. Contemporary Hispanic Ideas. Readings in twentieth-century Spanish and Spanish-American nonfiction. Open only to freshmen and sophomores. One course. Pérez

110. Spoken Spanish. Study of colloquial Spanish, practice in pronunciation and conversation, emphasis on oral communication. Prerequisite: Spanish 76 or consent of instructor. One course. Garci-Gómez and staff

111. Written Spanish. Grammatical problems in composition and translations; introduction to the techniques of literary and professional styles. One course. Pérez and staff

114S. Spanish Language: Peninsular or American. Topics to be announced. One course. Staff

117S. Advanced Grammar. A systematic study of modern Spanish morphology and syntax. Offered only in the Duke-in-Spain program. One course. Staff

118S. Translation from and into Spanish. Practice in translation, study of professional and model translations, with emphasis on improving skills in the use of both Spanish and English by means of close comparisons of the two languages. One course. Wardropper and staff

119S. Structure of Spanish. A systematic study of modern Spanish morphology and syntax with some readings in current linguistic theory. Prerequisite: Spanish 110 or 111. C-L: Linguistics. One course. Wheeler

121. Latin-American Literature. Fictional and poetic works of the last thirty years that have made an impact on world literature. Taught in English. One course. Fein

123S. Latin-American Literature and Revolution. Distinguished modern writers who have shaped their poetry or fiction around the necessity of social change. The readings will be in translation, with discussions in English. Open to freshmen only. One course. Fein

131. Topics of Hispanic Civilization. A humanistic study of Spain or Spanish America through history, culture, people, and institutions. C-L: Comparative Area Studies. One course. Staff

133S. Spanish-American Civilization. An interdisciplinary approach including architecture, cultural anthropology, history of ideas, and music. C-L: Comparative Area Studies. One course Fein

137. Aspects of Contemporary Spanish Culture. Offered only as part of the summer program in Spain. One course. Garci-Gómez

141S, 142S. Spanish Literature. Topics to be announced. Open to juniors and seniors. Two courses. Staff

144S. Spanish-American Literature of Identity. Exploration of the concepts of *lo criollo* or *lo americano*, essentially through the analysis of texts by Arriví, Carpentier, Neruda, Paz, and others. One course. Pérez

145S. Literature of the Hispanic Minorities of the United States. Representative Spanish-language works by Puerto Rican, Cuban-American and Chicano writers. One course. *Pérez*

146. The Spanish-American Novel. Masterworks of the twentieth century. C-L: Comparative Area Studies. One course. *Fein*

151. Spanish Literature of the Renaissance and the Baroque. Selected works of the sixteenth and seventeenth centuries with attention to their reflection of social, religious, and political ideas. C-L: Medieval and Renaissance Studies. One course. *Ross or Wardropper*

153. Golden Age Literature: Cervantes. Emphasis on the *Quijote*. C-L: Medieval and Renaissance Studies. One course. *Staff*

163. The Generation of 1898. Selected works by Unamuno, Baroja, Azorín, Valle-Inclán, and Machado. One course. *Osuna*

165S. Major Spanish Authors. Textual studies; methods of literary interpretation and criticism. One course. *Wardropper*

166. Nineteenth-Century Prose Fiction. Major forms in Spain and Spanish America: Clarín, Blest-Gana, Cambaceres, Galdós, and others. C-L: Comparative Area Studies. One course. *Pérez*

171. Literature of Contemporary Spain. A sociological approach to the novel, theater, and poetry: Goytisolo, Buero Vallejo, Sastre, Arrabal, Celaya, and Otero. C-L: Comparative Area Studies. One course. *Osuna*

181. Intensive Spanish. An introduction to the language. Modern readings. Prerequisites: four semesters of another foreign language or consent of instructor. One course. *Staff*

182. Readings in Spanish-American Literature. Prerequisite: Spanish 181 or consent of instructor. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. Two courses. *Staff*

210. History of the Spanish Language. Formation and development. Internal forces and external contributions. C-L: Comparative Area Studies, Linguistics, and Medieval and Renaissance Studies. One course. *Garcí-Gómez*

241. Colonial Prose of Spanish America. Narrative forms written in Spanish-America during the sixteenth, seventeenth, and eighteenth centuries. One course. *Ross*

245, 246. Modern and Contemporary Spanish-American Literature. 245: poetry from *Modernismo* to the present. 246: twentieth-century fiction. C-L: Comparative Area Studies. Two courses. *Fein and Pérez*

251. The Origins of Spanish Prose Fiction. Selected examples of the romance and the novel: *Amadís de Gaula*, Diego de San Pedro's *La Cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemayor's *Diana*. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

253. Cervantes. The life and thought of Cervantes with special emphasis on his *Quijote*. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

254. Drama of the Golden Age. The chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

258S. Spanish Lyric Poetry before 1700. Selected poems of the Middle Ages, Renaissance, and baroque. Special emphasis on the *Razón de amor, la poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

262. The Romantic Movement. Principal manifestations of romanticism in Hispanic literature; poetry (Becquer, Espronceda, Rosalia de Castro), drama (Rivas, Zorilla), and the novel (Isaacs, Marmol). One course. *Pérez*

275. Modern Spanish Poetry. Juan Ramón Jiménez, Unamuno, Antonio Machado, the Generation of 1927, and the contemporary poets. One course. *Osuna*

276. Modern Spanish Drama. The theater of Benavente, Valle-Inclán, Lorca, Casona, Buero Vallejo, Sastre, and Arrabal. One course. *Osuna*

277. Modern Spanish Novel. From the Generation of 1898 to the present. One course. *Osuna*

Courses Currently Unscheduled

122. Modern Mexico

ROMANCE LANGUAGES (RL)

218. The Teaching of Romance Languages. Evaluation of objectives and methods; practical problems involved in teaching these languages on the elementary, secondary, and college level; analysis of textbooks, special foreign language programs, audiovisual aids, and tests. Taught in English. One course. *Hull*

Courses Currently Unscheduled

150. Authorship in the Cinema

THE MAJOR IN FRENCH OR SPANISH

Prerequisite. French or Spanish 74 or 76 or equivalents.

Major Requirements. *French:* A total of eight courses numbered 100 or above. These must include 101, 102, and at least three courses above 140. *Spanish:* A total of eight courses numbered 100 or above. These must include two of the following: 101, 102, 105, 106; and at least three courses above 140. Courses numbered 120 through 129 (French and Spanish) are taught in English and do not count toward the major.

Study Abroad. Students are strongly urged to study abroad, since this is the best way to achieve language proficiency and to acquire an intimate knowledge of a country's culture. A maximum of two courses per semester, or one per summer, may be counted toward the major. (The summer course restriction does not apply to Duke-sponsored programs.)

Suggested Work in Related Disciplines. In order to give perspective to a student's program, majors in French or Spanish will normally select, with the approval of the major adviser, appropriate courses from such fields as: (1) other languages and literatures; (2) history; (3) philosophy; (4) music and art; and (5) linguistics.

THE FRENCH CURRICULUM

The French Curriculum is an offering of courses taught in French. Unlike the French courses offered by the Department of Romance Languages, however, in which language or literature is the essential subject matter, these are courses in various departments where French is simply the medium of instruction. Prerequisite: French SAT score of 600 (or the same score on the Placement Test), a score of 3 on the Advanced Placement Test in French, or prior completion of a French course numbered above 70.

Art 136: Gothic Cathedrals. *Bruzelius*

History 23: Europe to the Eighteenth Century. *Witt*

Music 119: The Humanities and Music. *Bartlet or Seebass*

Sociology 245: Paris and Montreal in 1900 and 1968. *Tiryakian*

These courses appear also in the listings of the several departments. They meet distributional and Field of Knowledge requirements as these are specified elsewhere in the undergraduate *Bulletin*. They do *not* meet requirements for the major in French.

Russian

For courses in Russian, see Slavic Languages and Literatures.

Science, Technology, and Human Values

Associate Professor Roland, *Director*

The Program in Science, Technology, and Human Values offers students the opportunity to develop a comprehensive view of science, medicine, or technology in social, historical, and ethical terms. Although a major is not available in this program, the course of study will enrich the understanding of one's profession for the future scientist, physician, or engineer and will broaden the appreciation of activities in these areas for others.

COURSE OF STUDY

Duke courses pertinent to the program are classified according to three areas: science, medicine, or technology. Within each area, the courses are further divided according to the approach: ethical, analytical (historical, philosophical, or sociological), or policy-centered. Each student entering the program designates, for purposes of advising, an area of primary interest and then selects a program of five courses (four for engineering majors) covering all three approaches. Individual programs, selected from more than fifty courses, are tailored to each student's interests.

Students in the program focus their course work and individual interests through a year-long interdisciplinary seminar offered in the senior year (Interdisciplinary Course 107S, 108S).

Full details concerning the program and courses in Science, Technology, and Human Values may be obtained by writing or calling the Director.

ELIGIBILITY AND CERTIFICATION

Students normally apply to the program at any time before the end of their junior year. On the basis of the expressed area of primary interest, each student is assigned a faculty adviser from the program steering committee, with whom he or she designs a program to suit his or her particular interests. To students who complete the program, Duke University gives official recognition of their participation.

Slavic Languages and Literatures

Professor Krynski, *Chairman*; Visiting Assistant Professor Pugh, *Director of Undergraduate Studies*; Assistant Professor Andrews, *Supervisor of Language Instruction*; Associate Professor Emeritus Jezierski

RUSSIAN (RUS)

1-2. Elementary Russian. Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Staff*

63, 64. Intermediate Russian. Intensive classroom and laboratory practice in spoken and written patterns. Reading in contemporary literature. Prerequisites: Russian 1 and 2 or two years of high school Russian. Two courses. *Staff*

91, 92. Advanced Russian Conversation and Readings. Nineteenth and twentieth century literature in the original. Conducted in Russian. Prerequisite for 91: Russian 63, 64 or equivalent; for 92: Russian 91. Two courses. *Staff*

91P, 92P. Preceptorial. Elective preceptorials for students enrolled in Russian 91, 92. *Staff*

100. Studies in Russian Culture. Introduction to the culture and political system of the USSR. Taught in the USSR in Russian or English depending on placement. C-L: Comparative Area Studies. One course. *Andrews*

124. Masters of Russian Short Fiction. Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Babel, and others. Readings in English. C-L: Comparative Area Studies. One course. *Staff*

161, 162. Introduction to the Russian Novel. Outstanding works. 161: Lermontov, Gogol, Turgenev, Goncharov, and Tolstoy. 162: Dostoevsky, Bely, Sologub, Bunin, and Gorky. Readings in English. C-L: Comparative Area Studies. Two courses. *Krynski*

172. Russian Prison Camp Literature. A survey of works in translation; including Avvakum, Dostoevsky, Nabokov, and Solzhenitsyn. One course. *Staff*

175. Tolstoy. Introduction to life and works. Readings in English will include *War and Peace*, *Anna Karenina*, the shorter fiction, dramatic works, and essays. Tolstoy's impact on the literature and thought of today, in and outside of Russia. C-L: Comparative Area Studies. One course. *Staff*

176. Dostoevsky. Introduction to life and works. Emphasis on his relevance to today's world. Readings in English of major works; close study of *Crime and Punishment*, *The Idiot*, and *The Brothers Karamazov*. Historical overview of critical reaction in Russia and abroad. C-L: Comparative Area Studies. One course. *Staff*

177. Introduction to the World of Chekhov. Close scrutiny of selected prose and dramatic works. Readings in English. C-L: Comparative Area Studies and Drama 165. One course. *Krynski*

185S. Introduction to Slavic Linguistics. Basic concepts of diachronic linguistics; emphasis on synchronic linguistic theory in the East, West, and South Slavic areas. Phonological, morphological, and syntactic structure of contemporary standard Russian. C-L: Comparative Area Studies and Linguistics. One course. *Andrews*

186S. History of the Russian Language. The development of the Russian language from the eleventh century, with consideration of literary and dialectal features. Readings in Russian. Prerequisites: third year Russian or consent of instructor. C-L: Comparative Area Studies and Linguistics. One course. *Pugh*

187. Russian and Central European Writers on Communism. Novels, essays, and philosophical works by Arendt, Koestler, Solzhenitsyn, and Milosz, in translation, against the works of Orwell, Silone, and Whittaker Chambers. One course. *Krynski*

191, 192. Independent Study. Directed reading and research. Open only to qualified students by consent of Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Prerequisite: consent of Director of Undergraduate Studies. Two courses. *Staff*

195. Advanced Russian. Review of grammar with an emphasis on the refinement of oral and written language skills. Prerequisite: Russian 92 or consent of instructor. One course. *Staff*

196. Readings in Modern Russian. An intensive reading and conversation course based on contemporary Russian literary and Soviet press texts, emphasizing problems in Russian-English and English-Russian translation. Prerequisite: Russian 195 or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

For Seniors and Graduates

201, 202. Russian Novel of the Nineteenth Century. 201: 1830-1870. 202: 1870-1900. Prerequisite: Russian 161, 162 or equivalent. C-L: Comparative Area Studies. Two courses. *Krynski*

225. Tolstoy. *War and Peace* and other works. Prerequisite: Russian 175 or equivalent. C-L: Comparative Area Studies. One course. *Staff*

232. Dostoevsky. Emphasis on *The Brothers Karamazov* and the theory of the novel. Prerequisite: Russian 176 or equivalent. C-L: Comparative Area Studies. One course. *Staff*

Courses Currently Unscheduled

183. Slavic Drama and Theater of the Twentieth Century

POLISH (POL)

11. Beginning Polish. Rapid survey of main elements of grammar. Emphasis on aural comprehension and pronunciation. Prerequisite: one year of any foreign language at the college level. Does not count toward a major in Russian. One course. *Krynski*

12. Intermediate Polish. Elements of grammar continued; speaking and reading. Prerequisite: Polish 11 or consent of instructor. Does not count toward a major in Russian. One course. *Krynski*

174. The Poles: Literature and Society, 1940-1980. Representative literary masterpieces. Emphasis on literary avant-garde of the 1950s and 1960s and on the dissident writings since 1975 and their impact on society. Readings in English. C-L: Comparative Area Studies. One course. *Krynski*

THE MAJOR

Prerequisites. Russian 1-2 and 63, 64 or equivalent.

Major Requirements. A minimum of eight courses in the department. All majors must take the following courses: Russian 91, 92, 195, 196, plus four courses in literature.

Students contemplating graduate work may elect a more intensive program consisting of ten courses. An in-depth knowledge of Russian literature or some knowledge of Polish language and/or literature will facilitate admission to graduate school and subsequent study in the field.

Sociology (SOC)

Professor Kerckhoff, *Chairman*; Associate Professor Wilson, *Director of Undergraduate Studies*; Professors Back, Maddox, Myers, Palmore, Preiss, Simpson, Smith, and Tiryakian; Associate Professors Campbell and George; Assistant Professors Gereffi, O'Rand, Spenner, and Stark; Adjunct Associate Professor Manton

Sociology combines an appreciation of human beings' capacity for self-realization with a scientific understanding of the causes and consequences of their social behavior. Each course aims to develop both the analytical and critical skills necessary for understanding and evaluating social institutions and social change. Emphasis is upon contemporary research and the use of sociological data in tackling social problems. Active involvement in the learning process is fostered through seminars, independent study, honors work, and internships.

10D. Introduction to Sociology. Structure and dynamics of groups, organizations, and institutions; social behavior over the life cycle; social control and deviance; population and social ecology; formation and change of societies. Two lectures and one discussion section. One course. *Simpson*

Social Issues of Contemporary Society. Topics vary from semester to semester. One course each. *Staff*

20S. Individual and Society

21S. American Demographics

22S. The Third World

23S. Social Organization

24S. Social History

25S. Deviance

101. Contemporary American Society. Social trends and social problems and their effects on individuals and society. Urbanization; bureaucracy; distribution of wealth, income, and power; status of minorities. One course. *Kerckhoff or Preiss*

102. America in the Modern World System. Sociological aspects of twentieth-century involvement of the United States in international economic, political, and social affairs, including the notion of American exceptionalism, the roots of American foreign policy, the role of the United States transnational corporations, the contemporary welfare state, the crisis of democracy debate, and the North-South dialogue. C-L: Comparative Area Studies. One course. *Gereffi*

106. Social Psychology. C-L: Psychology 106. One course. *Costanzo or George*

SOCIAL DIFFERENTIATION

111. Inequality in America. Differences in social position in the United States as they relate to income, prestige, and power. Primary focus on the process of achievement, including level of education and occupational position, while controlling for race, sex, and age. C-L: Women's Studies. One course. *Kerckhoff or O'Rand*

116. Black and White Relations in America. The history and changing nature of interaction between blacks and whites, including the sources and consequences of discrimination, integration, and black power. One course. *Preiss or O'Rand*

118. Sex Roles and Society. Nature and acquisition of sex roles. Cross-cultural variations. Developing nature of sex roles in American society. C-L: Comparative Area Studies and Women's Studies. One course. *O'Rand*

DEVIANCE

Sociology 120-123 are designed as a sequence, and might optimally be taken in that order, with Sociology 120 being recommended preparation for 121, 122, and 123. However, there are no prerequisites.

120. Perspectives on Deviant Behavior. Development and distribution of deviant social behavior, treating such topics as social disorganization; stress and strain; cultural and labeling theories in relation to crime and delinquency, drug addiction, homosexuality, suicide, or others. One course. *Preiss or Simpson*

121. Law Enforcement and Judicial Systems. Development and functions of criminal law. Perceptions and handling of crime and deviant behavior by police, prosecutors, and courts. Ethical, fiscal, and operational problems of achieving justice; cross-cultural comparisons. One course. *Preiss*

122. Punishment and Treatment of Deviants. Concepts of punishment and rehabilitation. Programs and facilities for deviants. Structure and operation of "total" institutions, such as prisons and hospitals. Problems of returning to family and community life. One course. *Preiss or Simpson*

123. Social Aspects of Mental Illness. Theoretical and practical sociological contributions to problems of etiology, definition, law, and treatment; comparisons with other contributions; questions of public policy and programs. One course. *Back, Preiss, or Palmore*

RESEARCH

125. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Anthropology 125, Comparative Area Studies, History 137, and Political Science 125. One course. *Staff*

132. Methods of Data Collection. Principles of social research, design of sociological studies, sampling, data collection with special attention to survey techniques. One course. *Myers*

133. Statistical Methods. Not open to students who have had Economics 138 or Mathematics 53 or 117. C-L: Psychology 117. One course. *Spenner and staff*

134. Using Sociology. An analytic framework for understanding the ways sociology has been used; ethical issues and consequences. One course. *Campbell, Preiss, or Smith*

138. History of Social Thought. Theories of society and social relations in the writings of Montesquieu, Rousseau, Comte, Marx, Weber, Durkheim, Simmel, Veblen, Sorokin, and others. The history of sociology in relation to philosophical currents, social movements, and transformation of the modern world. One course. *Tiryakian or Wilson*

139. Marxism and Society. A critical appraisal of Marxism as a scholarly methodology for understanding human societies. The basic concepts of historical materialism, as they have evolved and developed in historical contexts. Topics include sexual and social inequality, alienation, class formation, imperialism, and revolution. Core course for the program in Perspectives on Marxism and Society. C-L: Anthropology 139. One course. *Fox or Wilson*

POPULATION AND ECOLOGY

140. Environment and Society. Impact of technological and social change on sociological and environmental conditions. A multidisciplinary approach. One course. *Myers*

143. Business and Labor. Theories and current research on the interlocking roles of business and labor in the United States and elsewhere. One course. *Gereffi or Stark*

LIFE COURSE AND INSTITUTIONS

150. The Changing American Family. Structure, organization, and social psychology of marital, parental, and sibling relations over the life cycle of a family; courtship, marriage, family dissolution in relation to contemporary American society; deviations from and alternatives to the traditional nuclear family. C-L: Women's Studies. One course. *Kerckhoff or Simpson*

151. Sociology of Religion. The religious factor in modern society and the social factor in modern religion. Major sociological theories and marginal religious groupings. One course. *Tiryakian or Wilson*

152. Educational Settings and Processes. Structure and operation of schools, colleges, and universities. One course. *Campbell or Kerckhoff*

153. Sports and Society. The effect of sports on people, their self-image, and social roles. Relation of sports as an institution to the family, education, economics, and politics. One course. *Wilson*

154. Art and Literature in Society. An analysis of the social relations of the world of the arts (painting and sculpture, music, and literature) with emphasis upon creative artists, art publics, art organizations, and art works as they function in their social-cultural milieu. One course. *Back or Tiryakian*

155. Work in America. The labor process. The changing meaning of work. Job satisfaction. Choosing jobs and disengaging from the work role. C-L: Women's Studies. One course. *Simpson, Stark, or Wilson*

156. Sociology of Science. The social organization of science: the social relations between scientists, laboratory life, and professional associations. Its impact on the methods and processes of scientific discovery. Historical and contemporary materials from biology, chemistry, and physics. One course. *O'Rand*

161. Aging and Death. Basic theories and demography of human aging; social problems caused by increased longevity; social-psychological factors in attitudes toward death, mortality, accidental death, suicide, and murder. One course. *George or O'Rand*

162. Health and Illness in Society. Relations between patients and health professionals, and utilization of resources for health care. One course. *Back*

165. Occupations and Career Development. How occupations organize and control labor markets, define services, chart career lines, and develop and sustain occupational identities. One course. *Simpson or Spenner*

167. Uses and Abuses of Power. Theories of and research on political power at the community, national, and international levels. C-L: Women's Studies. One course. *Gereffi, Smith, or Stark*

169. Psychosocial Aspects of Human Development. See C-L: Interdisciplinary Course 180; also C-L: Human Development and Psychology 130. One course. *Martin Lakin and Maddox*

SOCIAL ISSUES AND PROCESSES

170. Mass Communication. An analysis of the role of radio, the press, magazines, movies, and television. An examination of the selective audiences, content characteristics, controlling elements, and organizational structure of the various media. Comparative Canadian material considered where feasible. C-L: Canadian Studies, Comparative Area Studies, and Film. One course. *Smith*

171. Comparative Health Care Systems. The interaction of historical, political, economic, legal/ethical, and sociological factors in the organization and operation of health care systems in the United States, the United Kingdom, Sweden, and elsewhere. C-L: Comparative Area Studies. One course. *Maddox*

173. Social Conflict and Social Movements. Mobilization and strategy of riots, demonstrations, public interest groups, social movements, and revolutions. One course. *Wilson*

175. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, and Religion 156. One course. *Staff*

178. Colonialism, Neocolonialism, and Internal Colonialism. Ideological, structural, and socio-psychological dimensions of colonization and decolonization in the modern world, with special reference to sub-Sahara Africa. C-L: Comparative Area Studies. One course. *Tiryakian*

179. Sociology of Nationalism. A comparative sociological study of major nationalist movements: Western nationalism in the nineteenth century, anti-Western movements of the Third World, and regional movements within and against established nation-states. C-L: Canadian Studies and Comparative Area Studies. One course. *Tiryakian*

180. Modern Revolutions. Comparative analysis of the causes, processes, and outcomes. French, Russian, and Chinese cases as well as recent revolutions and upheavals. C-L: Comparative Area Studies. One course. *Stark or Tiryakian*

181. Contemporary Socialist Societies. Comparison of forms of inequality, the organization of work, and patterns of opposition. C-L: Comparative Area Studies. One course. *Stark*

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, History 184, and Political Science 184. One course. *Leach*

193, 194. Independent Study. Prerequisite: consent of instructor. Two courses. *Staff*

195S, 196S, 197S. Seminar in Special Topics. Three courses. *Staff*

For Seniors and Graduates

201S. Social Change. Comparisons of alternative theoretical schools of social change and societal transformations: functional, evolutionary, conflict, Marxist, dependency, and world systems perspectives. C-L: Comparative Area Studies. One course. *Gereffi or Tiryakian*

203. Comparative Aspects of Societal Transformation. Comparative perspectives on the major axes of social differentiation within societies (age, sex, class, religion) and their related forms of social organization (kinship networks, labor markets,

professions, social movements). Ecological, demographic, and ideological factors in societal transformation. C-L: Comparative Area Studies. One course. *Simpson or Smith*

204. The Dynamics of Global Interdependence. Emergence and structure of interdependence. Stability and change. Societal interdependence at the social, cultural, political, and economic levels. C-L: Comparative Area Studies. One course. *Gereffi or Tiryakian*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, History 234S, and Interdisciplinary Course 234S. One course. *Bergquist, Fox, Gereffi, Smith, or Valenzuela*

241. Social Stratification. The nature of hierarchical and vertical differentiation for the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. The transmission of inequality from one generation to the next. C-L: Comparative Area Studies. One course. *Campbell, O'Rand, or Stark*

243. Population Dynamics and Social Change. Social scientific aspects of the determinants and consequences of population trends. C-L: Comparative Area Studies. One course. *Myers*

244. Human Ecology and Urban Systems. Origins and development of human ecology theory, growth of cities and urban systems, residential segregation of social classes and racial and ethnic groups. C-L: Comparative Area Studies. One course. *Myers or Smith*

255. Political Sociology. Pluralist, elite, and class theories of the relationship between state and society. Topics include: recent debates on the welfare state, social control, political participation, and state-society relations in socialist economies. C-L: Political Science 255. One course. *Smith, Stark, or Tiryakian*

276S. Social Structure and the Life Course. The organization of education, career sequences, cohort patterns, role definitions, adolescence, old age, and retirement; variations by race and sex. One course. *Campbell, Maddox, or O'Rand*

277S. Social Patterns of Personal Development. The effects of the family, school, work, and other institutional settings on the individual. C-L: Women's Studies. One course. *Kerckhoff, O'Rand, or Preiss*

279S. Social Psychology. Study of group structure and processes. Dynamic relations within and between groups and the links between groups and societies. One course. *Back or Preiss*

280S. Contemporary Sociological Theory. An analysis of the structure and foundations of recent formulations of such theoretical approaches as phenomenological sociology, exchange theory, critical theory, structuralism, neo-Marxist sociology, sociobiology, and action theory. One course. *Tiryakian or Wilson*

281S. Development of Sociological Theory. Sociological thought from Comte to contemporary theorists, with particular focus on Parsons and the Parsonian School. The societal and institutional context of the development of sociological theory and paradigms. One course. *Tiryakian or Wilson*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, and Political Science 282S. One course. *Leach*

293. Introductory Statistical Analysis. Basic descriptive statistics, regression and correlation, t-tests and the analysis of variance, chi square techniques, and other topics. Stress on practical applications. Statistical computing using SPSS and other programs. One course. *Campbell*

294. Intermediate Statistical Analysis. The general linear model and its application in methods of multivariate statistical analysis: analysis of variance and covariance, multiple regression and path analysis, and log-linear models for categorical data. Statistical computing using SPSS and other programs. Prerequisite: Sociology 293 or equivalent. One course. *Campbell*

296S. Research Methods and Methodology. Presuppositions and basic questions in the methodology of social scientific research. Alternative research designs and the assumptions and methods of analysis. One course. *Back, Campbell, or Smith*

297S. Data Collection and Analysis. Survey of methods of sociological data collection: observation, experiments, surveys, and historical studies. Issues in the analysis of data: organizing data, coding, indexes, descriptive and analytic measures. Problems of interpretation, verification, and dissemination of research results. One course. *Back, Campbell, Kerckhoff, or Smith*

298S, 299S. Seminar in Selected Topics. Substantive, theoretical, or methodological topics. Two courses. *Staff*

COURSES CURRENTLY UNSCHEDULED

145. The Modern City in Comparative Perspective

177. The Community: Myths and Realities

233. Culture, Religion, and Modernity

THE MAJOR

Prerequisite. Sociology 10D or an equivalent course with consent of the Director of Undergraduate Studies.

Major Requirements. Eight courses above 101: Sociology 132, 133, 138, one 200-level course, and four others. Only one independent study credit can be applied to the major; it may not substitute for a required course.

A student may complete a second major in sociology. Requirements and advising are the same for the second major as for the first major.

A *Handbook for Sociology Majors*, available in the office of the Director of Undergraduate Studies, describes areas of concentration, the honors program, and the Sociology Union. It also describes the departmental advising system and the interests of the faculty.

Statistics

Although there is no undergraduate major in statistics, a concentration in statistics is available as part of a major in mathematics or economics. Statistics courses at both introductory and advanced levels are also offered by several other departments. For detailed information on statistics courses, consult *Statistics at Duke*, available from the Department of Mathematics.

Swahili

For courses in Swahili, see Asian and African Languages.

Women's Studies

Associate Professor J. O'Barr (political science), *Director*

The Program in Women's Studies provides students with an understanding of the forces that shape the position of women in society and develops an appreciation of women's experience. A certificate will be offered for those who complete the requirements of the program. Women's studies students will be expected to major in another discipline, with women's studies a supplement to their major.

The Women's Studies Program requires that students take a total of five related courses. The first requirement is that every student must take an introductory survey course, Interdisciplinary Course 103. Participants also take a basic course in gender roles. This requirement is based on the premise that in order to understand the position of women in society, the process of socialization and acculturation must be understood. Three courses are available in this area, two in anthropology, the other in sociology. They present theoretical perspectives on gender stratification and provide an important introduction to the study of women in specific disciplines. The third requirement is two courses, to be chosen from a wide selection, that deal specifically with women's experience in a particular field whether that be history, religion, literature, or health care. The fourth and final requirement is that students take one course that deals with the way in which women's experience relates to various aspects of society and culture. This progression will create a coherent academic experience introducing students not only to the underlying concepts of women's studies but also to the way in which women's experience fits into a broader study of society, culture, and the interaction of different groups.

The courses listed below may be taken to fulfill the requirements. For a complete description of each course consult the listing of the appropriate department.

Introductory Course

Interdisciplinary Course 103. An Introduction to Women's Studies. *J. O'Barr and staff*

Gender Role Courses

Anthropology 115. Gender Roles: A Cross-Cultural Perspective. *Staff*

Anthropology 215S. The Anthropology of Women: Theoretical Issues. *Dominguez, Quinn, or Smith*

Sociology 118. Sex Roles and Society. *O'Rand*

Women's Studies Courses

Anthropology 131. Socialism and Society in China. *Weller*

Arabic 173. Women in Modern Arabic Literature. *Cooke*

French 159. Feminist Fiction. *Orr*

History 169, 170. The Social History of American Women. *A. Scott*

History 171. A History of Women in Europe. *Neuschel*

Philosophy 122. Philosophical Issues in Feminism. *Jackson*

Political Science 163. Gender, Politics, and Policy. *O'Barr*

Religion 109. Women in the Biblical Tradition: Image and Role. *C. Meyers*

Religion 125. Women and Sexuality in the Christian Tradition. *Clark*

Courses on Women in Relation to Society and Culture

Anthropology 137. Incest, Adultery, and Other Problems in Kinship and Marriage. *Dominguez or Quinn*

English 163. Twentieth Century American Poetry. *Pope*

History 160. The United States from the New Deal to the Present. *Chafe*

History 227-228. Recent United States History: Major Political and Social Movements. *Chafe*

Political Science 129. Political Participation. *Paletz*

Political Science 187. Politics and the Libido. *Paletz*

Psychology 135S. Hormones and Behavior. *B. Erickson*

Religion 234. Early Christian Asceticism. *Clark*

Sociology 111. Inequality in America. *Kerckhoff or O'Rand*

Sociology 150. The Changing American Family. *Kerckhoff or Simpson*

Sociology 155. Work in America. *Simpson, Stark, or Wilson*

Sociology 167. Uses and Abuses of Power. *Gereffi, Smith, or Stark*

Sociology 277S. Social Patterns of Personal Development. *Kerckhoff*

In addition to these regularly offered, cross-listed courses, every department teaches rotating topics courses that treat pertinent issues in sex roles and women's studies. The student should consult the Women's Studies Program each semester for information on such courses. The following examples include previous topics in this category:

Courses on Women

Classical Studies 196S. Sex Roles in Antiquity
English 026S. Twentieth Century Identity Novels
English 026S. American Women's Poetry
English 131. Virginia Woolf
English 139S. Modern British Feminist Novel
English 179S. Studies in Women's Literature
French 104S. Portraits of a Lady: Studies in Literary Images of Women
French 141S. Women Writers of the Renaissance
French 290S. Studies in a Contemporary Figure: Wittig
German 103S. Contemporary Women Writers in Germany
History 196. Modern European Women
Political Science 200A. Contemporary American Feminism
Psychology 170B. The Psychology of Women
Public Policy Studies 264. Women and Justice
Sociology 20S. Sex Discrimination

Courses on Women and Society

Anthropology 280. Marxism and Feminism
English 026S. Solitary in Fiction
English 139. The Bloomsbury Group
French 169. Contemporary Novel in French Canada
Public Policy Studies 195S. Child Policy in the United States
Public Policy Studies 276S. National Policies and the Family
Sociology 20S. Social Networks

THE PROGRAM

Students are eligible for a certificate in women's studies after completing the introductory course, one course on gender roles, two courses that deal exclusively with women's experiences, and one course that deals with women in relation to society and culture. The Women's Studies Program will provide academic advice and assistance to students who become part of the program. Information is available at the Office of Women's Studies, 105 East Duke Building.

Writing

UNIVERSITY WRITING COURSES

The writing requirement may be fulfilled by successfully completing University Writing Course 4, 5, 6, or 7, each of which involves expository themes and regular individual conferences.

4. Principles and Practice of Writing. Designed for those who are prepared to write college-level prose but will benefit from a review of the principles of good writing. Themes based on British and American prose. One course. *Staff*

5. Persuasive Writing. Themes based chiefly on readings in prose non-fiction. One course. *Staff*

6. Interpretive Writing. Themes based chiefly on readings in literature. One course. *Staff*

7. Scholarly and Critical Writing. Themes and readings vary with the topic of each section. Some sections may be coordinated with other courses. One course. *Staff*

For other courses in writing, see listings for Department of English and Institute of the Arts.

Zoology (ZOO)

Professor Nicklas, *Chairman*; Professor Fluke, *Director of Undergraduate Studies*; Professors Barber, Costlow, Gillham, Klopfer, Livingstone, Staddon, Tucker, Vogel, Wainwright, Ward, and Wilbur; Associate Professors Forward, Lundberg, McClay, H. Nijhout, Rausher, and Sutherland; Assistant Professors Conner, M. Nijhout, Roth, and Uyenoyama; Adjunct Professor Schmidt-Koenig

The introductory course, Principles of Biology, is listed under Biology in this bulletin. See also Introductory Animal Diversity, below.

In addition to those courses bearing the S or T suffix, and independent study, the following zoology laboratory courses also count for the requirement for small-group learning experiences: 204L, 216L, 226L, 258L.

COURSES GIVEN ON THE DURHAM CAMPUS

49S. The Meaning of Structure. The structural design principles that underlie function, failure, and fancy in natural and manmade things. Gaps and connections between science and art. Does not count toward the divisional or fields of knowledge requirements. One course. *Wainwright*

74L. Introductory Animal Diversity. Structure, functions, and habits of animals; classification, evolutionary origins, and phylogenetic relationships of major extant groups. One course. *Rausher or Roth*

100. Perspectives on Living Systems: Organization of Life. For upperclass students not intending majors in a biological science. Not open to students who have taken Biology 14L. May be substituted for Biology 14L only with the consent of the Director of Undergraduate Studies in zoology. One course. *Vogel*

101. Learning and Adaptive Behavior. Prerequisite: none, but some knowledge of quantitative science is desirable. See C-L: Psychology 101. One course. *Staddon*

103L. Principles of Ecology. Physical, chemical, and biological processes that determine the distribution and abundance of animals, emphasizing population dynamics, species interaction, biogeography, nutrient cycling, and energy flow through food webs. Prerequisites: introductory biology and Mathematics 31. Laboratory includes fieldwork. One course. *Livingstone*

108L. Developmental and Comparative Anatomy of Vertebrates. The embryology, anatomy, and evolutionary development of vertebrate organ systems. Prerequisite: introductory biology. One course. *Lundberg*

117. Introduction to Genetics. The effects of heredity and environment upon the individual and the population. Readings and discussions dealing with human problems. Not intended for students whose professional goals are genetics or cell biology. Students may not receive credit for both Zoology 117 and 180. Prerequisite: introductory biology or consent of instructor. C-L: Genetics—The University Program. One course. *Ward*

145. Physical Radiations and Biological Significance. Kinds of physical radiations, related biological hazards and benefits. Levels of concern for plants and animals, including humans. Protection, cellular repair processes. Prerequisites: introductory biology and Chemistry 12. One course. *Fluke*

151L. Principles of Physiology. Functional aspects of respiration, circulation, neural and hormonal coordination, water balance, metabolism, thermoregulation, and responses to special environments. Prerequisites: introductory biology and Chemistry 12. One course. *Conner or Tucker*

160. Principles of Cell Biology. Structure and function of organelles, metabolism, and regulatory mechanisms. Prerequisites: introductory biology and Chemistry 12. One course. *McClay or M. Nijhout*

160L. Principles of Cell Biology. See Zoology 160. Includes laboratory. One course. *McClay or M. Nijhout*

178. Functional Morphology. Structural basis of function of tissues, organs, and organisms in various phyla. Not open to students who have had Zoology 179. Prerequisite: Zoology 108 or 175 or 176 or consent of instructor. One course. *Wainwright*

179T. Tutorial in Functional Morphology. See Zoology 178. Essays and oral reports. Not open to students who have had Zoology 178. Prerequisite: consent of instructor. One course. *Wainwright*

180. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisites: introductory biology and Chemistry 12 and Mathematics 31 or equivalents. C-L: Botany 180, Botany 280, Genetics—The University Program, and Zoology 280. One course. *Antonovics, Boynton, and Gillham*

191, 192. Independent Study. For junior and senior majors with consent of Director of Undergraduate Studies and supervising instructor. Three courses of 191 and 192, maximum. Credit to be arranged. *Staff*

196D. Human Sex and Sexuality. Anatomical, physiological, and psychological aspects of sexuality. Weekly lectures by specialists. Does not satisfy major, divisional, or fields of knowledge requirements. Pass/fail grading only. Half course. *Klopper and staff*

For Advanced Undergraduates and Graduates

201L. Animal Behavior. Physiological and developmental studies. Laboratory emphasizes research projects. Prerequisites: physiology and genetics or consent of instructor; evolution recommended. One course. *Klopper*

204L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and weekend field trips. Prerequisites: an introductory ecology course and consent of instructor. One course. *Christensen (Botany) and Wilbur*

216L. Limnology. Lakes, ponds, and streams; their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities. Laboratory includes field trips. Prerequisites: introductory biology and Chemistry 12 and Mathematics 32 and physics or consent of instructor. One course. *Livingstone*

222L. Entomology. The biology of insects: diversity, development, physiology, and ecology. Field trips. Prerequisite: introductory biology. One course. *H. Nijhout*

226L. Ichthyology. Diversity, evolution, natural history, and ecology of fishes. Laboratory includes overnight field trips to marine and freshwater habitats. Prerequisites: introductory biology and Zoology 108L. One course. *Lundberg*

233. Principles of Insect Behavior. Processes governing the behavior of animals as illustrated by insects. Neural integration, communication, genetics, ecology, and evolution of individual and social behavior. Invertebrate zoology or entomology recommended. One course. *Conner and Rausher*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: intro-

ductory biology and one course in animal or plant diversity. C-L: Botany 237L. One course. *Lundberg and Mishler*

244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Zoology 160 and Chemistry 151 and consent of instructor. C-L: Microbiology 244. One course. *Amos and McClay*

247S. Photobiology. Effects of visible light and of ultraviolet and near ultraviolet radiation in living systems: repair processes, quantum processes, physical optics. Prerequisites: college physics and introductory biology. One course. *Fluke*

249. Biomechanics. Principles of fluid and solid mechanics applied to biological systems. Prerequisites: Physics 51 and Mathematics 31 or equivalents. One course. *Vogel and Wainwright*

252. Comparative Physiology. Physiological mechanisms in relation to animal life in nature. One course. *Staff*

258L. Laboratory Research Methods. Radioactivity and scintillation counting, spectrophotometry and enzyme kinetics, protein and cell component separatory methods, and other analytical methods, according to individual research interests. Prerequisite: consent of instructor. One course. *Fluke and staff*

259L. Laboratory in Biomechanics. Introduction to instruments used in investigations of solid and fluid biomechanics. Exercises and individual projects. Prerequisite: Zoology 249. One course. *Vogel and Wainwright*

261. Biology of Parasitism. How parasites, from viruses through vertebrates, have solved the special problems associated with their dependence on other organisms. Prerequisites: Zoology 74L and 160. One course. *M. Nijhout*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, and Microbiology 269. One course. *McClay and staff*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisite: Zoology 74L or a course in genetics. C-L: Botany 286 and Genetics—The University Program. One course. *Antonovics, Uyenyoyama, and Wilbur*

287. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Botany 287. One course. *Mishler and Roth*

288. Mathematical Population Genetics. Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating systems, sex ratio, stochastic processes. Calculus required; statistics and linear algebra recommended. C-L: Genetics—The University Program. One course. *Uyenyoyama*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life-cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and weekend field trips. Prerequisites: calculus and ecology and consent of instructor. C-L: Botany 293L. One course. *Antonovics and Wilbur*

295S, 296S. Seminar. Topics, instructors, and course credits announced each semester. *Staff*

COURSES GIVEN AT BEAUFORT

Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory, Beaufort, North Carolina, and for details of the fall, spring, and summer programs for undergraduates at Beaufort.

114L. Introduction to Biological Oceanography. Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms. Laboratory emphasis. Not open to students who have had Geology 53 or Botany 53. Prerequisite: introductory biology. C-L: Botany 114L and Marine Sciences. One course (spring); one and one-half courses (summer). *Barber, Ramus, and staff*

150L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. C-L: Marine Sciences and Zoology 250L. One course. *Forward*

167. Analysis of Marine Ecosystems. Major marine ecosystems, the physical and biological characteristics of each as a functional entity. Prerequisites: Biology 14L and Chemistry 12. C-L: Botany 167 and Marine Sciences. One course. *Barber*

169L. Marine Communities. Dynamics of marine communities in the context of current ecological theory. Life history strategies, competition, predation, diversity, and stability; detailed considerations of benthic and pelagic communities. Students may not receive credit for both Zoology 103L and 169L. Prerequisites: introductory biology and Mathematics 31. C-L: Marine Sciences. One course. *Sutherland*

176L. Marine Invertebrate Zoology. Structure, functions, and development of invertebrates collected from estuarine and marine habitats. Not open to students who have had Zoology 274. Prerequisite: introductory biology. One and one-half courses. *Bookhout (emeritus staff)*

191, 192. Independent Study. For junior and senior majors with consent of Director of Undergraduate Studies and supervising instructor. Three courses of 191 and 192, maximum. Credit to be arranged. *Staff*

For Advanced Undergraduates and Graduates

203L. Marine Ecology. Application of ecological theory to marine systems. Mathematical properties of population growth and species interactions; field and laboratory projects with computer-assisted analysis of data. Practice in scientific writing. Readings from current scientific publications. Prerequisites: introductory biology or invertebrate zoology and calculus; knowledge of statistics recommended. C-L: Marine Sciences. One and one-half courses. *Sutherland*

215L. Primary Productivity in the Seas. Prerequisites: introductory biology and chemistry. See C-L: Botany 215L; also C-L: Marine Sciences. One course. *Barber and Ramus*

250L. Physiology of Marine Animals. See Zoology 150L. C-L: Marine Sciences. One course. *Forward*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips. Not open to undergraduate students who have had Zoology 176 except by consent of Director of

Undergraduate Studies. Prerequisite: introductory biology. C-L: Marine Sciences. One and one-half courses. *Barnes (visiting summer faculty)*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. C-L: Marine Sciences. One and one-half courses. *McClay and visiting staff*

COURSES CURRENTLY UNSCHEDULED

193T, 194T. Tutorial

THE MAJOR

Students may obtain a copy of the *Handbook for Zoology Majors* from the office of the Director of Undergraduate Studies. The handbook describes the advising system and special programs, and gives the interests and background of the faculty. Possible areas of concentration are molecular and cellular biology, organismic biology, population biology, animal behavior, ecology, and marine sciences.

For the A.B. Degree

Prerequisite. Biology 14 or consent of Director of Undergraduate Studies.

Corequisites. Zoology 74L; Mathematics 31, 32, or 34; Chemistry 11, 12, and 151; and Physics 51, 52.

Major Requirements. A minimum of eight courses, not including the above prerequisites and corequisites, but including at least five zoology courses; four of these must be other than independent study, tutorials, or seminars, and at least two must have related laboratory experience (not including Zoology 74L). The zoology courses must represent at least three of these five areas: genetics, cell biology, physiology, ecology, and evolution. The eight courses may include as many as three nonzoology courses taken in appropriate related departments at the 100 level or above (in chemistry, above organic chemistry), which have prior approval of the Director of Undergraduate Studies for zoology. (See *Handbook for Zoology Majors* for a listing of such courses already approved.) No one course may be used to satisfy the requirements for zoology and another major, or for a zoology major and a second or third division distributional requirement.

For the B.S. Degree

Prerequisite. Biology 14 or consent of Director of Undergraduate Studies.

Corequisites. Zoology 74L; Mathematics 31, 32, or 34; Chemistry 11, 12, and 151; and Physics 51, 52.

Major Requirements. Same as the A.B. degree requirements except that a minimum of nine courses, not including the above prerequisites and corequisites, is required. These may include as many as four nonzoology courses taken in appropriate related departments. All other qualifications and restrictions are identical with those for the A.B. degree.

Other Major Programs

As an alternative to the above programs, a student with unusual interests in zoology may arrange a negotiated concentration of study. After appropriate discussion with departmental faculty, a student may devise a program of study which must be endorsed by two members of the faculty and approved by the undergraduate director. The statement of the proposed program must make clear why the negotiated major is more appropriate than a conventional major. Such a program must be

arranged before the start of a student's fifth semester. The only formal limitation on this approach to the major is that it include at least five courses in zoology to meet the minimum Trinity College requirements. See the *Handbook for Zoology Majors* for additional details.

An interdepartmental program may be pursued instead of a departmental major. The Director of Undergraduate Studies for zoology may arrange administrative responsibility for such programs. See requirements under Biology for the major in biology.

Honors

The department offers a program for graduation with distinction in zoology. See the section on honors in this bulletin. The Director of Undergraduate Studies can provide more details.

School of Engineering

Professor Dowell, *Dean*; Professor Shepard, *Associate Dean*

ENGINEERING (INTERDEPARTMENTAL) (EGR)

11. Engineering Graphics. Graphical theory and techniques for engineering design and communication. Visualization and conventional representation of points, lines, surfaces, and objects using freehand sketches. Orthographic (including sectional and auxiliary), perspective, isometric, and oblique views. Introduction to working drawings. Elements of descriptive geometry. Half course. *Arges*

23. Principles and Practices in Engineering Economics. Introduction to the principles and practices in engineering economics. The initial set of lectures develops a general understanding of basic engineering economics and break-even analysis/minimum cost in engineering design. The second set of lectures focuses on industrial practices and public projects: interest formulas, annual and present worth, as well as taxes and depreciation. The final lectures address forecasting and uncertainty in engineering economics. One course. *Peirce*

24. Environmental Engineering Science. The technical fundamentals of the five major areas of environmental engineering science—water quality, air quality, noise control, solid and hazardous wastes, and professional ethics—are introduced with case studies and real-world examples. Prerequisite: Chemistry 11. One course. *Vesilind*

51. Computers in Engineering. Introduction to use of digital computers in engineering. Attributes of digital computer systems; program languages; algorithm development; numerical analysis, including approximation and interpolation, searches and maximization, linear equations; applications to engineering; interactive computing, editing, and file handling; computer graphics. Not open to students who have completed Computer Science 51. One course. *Carroll, Garg, Medina, Melosh, Muga, Owen, Pas, Utku, or Wright*

52. Computational Methods in Engineering. Introduction to computer methods and algorithms for analysis, simulation, and optimization of engineering systems; matrix, direct, and iterative analysis techniques; finite increment techniques; linear programming. Requires prior programming experience and learning Fortran or Pascal type languages with minimal help from the course. One course. *Melosh or Utku*

75. Mechanics of Solids. Analysis of force systems and their equilibrium as applied to engineering systems. Stresses and strains in deformable bodies; mechanical behavior of materials; applications of principles to static problems of beams, torsion

members, and columns. Selected laboratory work. Prerequisites: Physics 51 and Mathematics 32. One course. *Arges, Muga, or J. F. Wilson*

83. Structure and Properties of Solids. Introduction to materials science and engineering, emphasizing the relationships between the structure of a solid and its properties. Atomic and molecular origins of electrical, mechanical, and chemical behavior are treated in some detail for metals, alloys, polymers, ceramics, glasses, and composite materials. Prerequisites: Chemistry 11 and Mathematics 31. One course. *Cocks, Jones, Pearsall, or Shepard*

101. Thermodynamics. The principal laws of thermodynamics for open and closed systems and their application in engineering. Properties of the pure substance, relationships among properties, mixtures and reaction. Principles and applications of statistical thermodynamics. Prerequisite: Physics 52. One course. *Harman*

123. Dynamics. Principles of dynamics of particles, rigid bodies, and selected non-rigid systems with emphasis on engineering applications. Kinematic and kinetic analysis of machine elements in a plane and in space using graphical and analytical vector techniques. Absolute and relative motion analysis. Work-energy; impact and impulse-momentum. Introduction to vibrations, wave motion, and Lagrange's equations. Prerequisites: Mathematics 103 and Engineering 75 or consent of instructor. One course. *Buzzard, Petroski, J. F. Wilson, or Wright*

130. Modeling and Analysis of Dynamic Systems. Mathematical modeling of mechanical, electrical, fluid, and thermal systems. Emphasis is placed on a universal approach to system analysis. Topics include: state variables, linearization methods, transfer functions and block diagrams, and feedback techniques for the control of dynamic systems. Prerequisites: Mathematics 103 and Physics 51. One course. *Garg or Quinlan*

135. Continuum Mechanics. The concept of continua. Vectors. Cartesian tensors. Stress, deformation, and velocity fields. Constitutive equations. Mechanical properties of solids and fluids. Simple problems in elasticity, viscoelasticity, and plasticity. Prerequisites: Mathematics 104 or 111 and Physics 51. One course. *Petroski*

151. Computer Simulations in Engineering. Simulation of various engineering systems, starting from their mathematical formulations. Simulation of the boundary value, eigenvalue, and the initial value problems. Examples from the beam-, truss-, and plate-theories, the fluid flow, the heat transfer, and the dynamics of mechanical and electrical systems. Use of widely used numerical algorithms. Identification of the problems associated with numerical simulations. Prerequisite: junior standing in engineering. One course. *Utku*

174. Technology Assessment and Social Choice. Societal, economic, environmental, psychological, and ethical considerations in the design and application of technological systems; techniques for technological forecasting and assessment; citizen participation in policy making; recent case studies; interdisciplinary team project. C-L: Public Policy Studies 174 and Religion 174. One course. *Garg and McCollough*

175. Aesthetics, Design, and Culture. An examination of the role of aesthetics, both as a goal and as a tool, in a culture which is increasingly dependent on technology. Visual thinking, perceptual awareness, experiential learning, conceptual modeling, and design will be explored in terms of changes in sensory environment. Design problems will be formulated and analyzed through individual and group design projects. Fall semester. One course. *Pearsall*

183, 184. Projects in Engineering. Courses in which engineering projects of an interdisciplinary nature are undertaken. The projects must have engineering relevance in the sense of undertaking to meet human need through a disciplined ap-

proach under the guidance of a member of the engineering faculty. Prerequisite: consent of instructor. Two courses. *Staff*

COURSES CURRENTLY UNSCHEDULED

165. Special Topics in Engineering

172A. Contemporary Science: Issues and Challenges

172B. Contemporary Technology: Issues and Challenges

187. History of Nuclear Energy: Civilian Applications

188. History of Nuclear Energy: Military Applications

Biomedical Engineering (BME)

Professor McElhaney, *Chairman*; Associate Professor von Ramm, *Director of Undergraduate Studies*; Professors Barr, Clark, Hammond, Hochmuth, Nolte, Pilkington, Plonsey, Thurstone, and Wolbarsht; Associate Professor Burdick; Assistant Professors Miller and Riederer

Biomedical engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modeling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The undergraduate program in biomedical engineering is flexible and can satisfy the requirements for entrance into graduate work in engineering, physiology, biology, or medicine.

Opportunities for student research are available in the biomedical engineering laboratories. The department utilizes digital computers extensively, and computer science techniques are applied in acquiring, processing, and modeling biological data. Research in the biomedical materials laboratory is directed toward the development of materials suitable for use in biological environments such as the vascular system. Biomedical engineering in pediatric cardiology involves study of the electrical activity of the heart and heart tissues in animals and humans, to increase the basic knowledge of their normal and abnormal behavior. Other electrophysiological systems are examined through the application of models and simulation techniques. The ultrasound imaging laboratories are employed for research and instruction in the biomedical application of this important technique. Ultrasound instrumentation measures and images biological tissue structures, and the laboratories are equipped with a variety of advanced ultrasonic imaging instruments. A transducer fabrication facility, test equipment for the design and construction of advanced ultrasound systems, a dedicated VAX 11/780 computer for image processing, and extensive video recording and display facilities are available. Other areas of research and instruction in medical imaging include digital angiography and NMR imaging. The biomechanics laboratory is equipped to measure biomechanical responses of tissues and organs and gait parameters, and to test protective headgear and develop new prosthetic devices. A membrane and cell biomechanics laboratory is equipped with several microscopes, electromechanical and pneumatic micromanipulators, and video systems dedicated to the study of the elastic and viscous behavior of living cells and membranes, especially normal and abnormal human red-cell membranes.

101. Electrobiological. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Prerequisites: Physics 52 and Electrical Engineering 61. One course. *Plonsey*

110. Introductory Biomechanics. Static and dynamic analysis of biological systems; analysis of gait and locomotion; ballistocardiography; biomechanical aspects of various sport activities, diving, and jumping; power, work, and energy concepts applied to the human body; strength and properties of tissue; and injury mechanisms and tolerance. Prerequisite: Mathematics 31. One course. *Hochmuth and McElhaney*

132. Statistical and Computational Methods in Signal Processing. Prerequisite: Biomedical Engineering 171 or Electrical Engineering 112. C-L: Electrical Engineering 132. One course. *Nolte*

132X. Statistical and Computational Methods in Signal Processing. Introduction to fundamental concepts of signal processing with particular emphasis on assessing the sensitivity of the model estimators to uncertainties in measured data. Extensive computer simulations. Prerequisite: Biomedical Engineering 171 or Electrical Engineering 112. One course. *Pilkington*

145. Chemical Thermodynamics. Thermodynamic properties and thermodynamic state. Exchange of heat and work in quasi-equilibrium processes. Chemical and phase equilibria of multicomponent mixtures. Prerequisite: junior standing. One course. *Clark and Hochmuth*

163, 164. Biomedical Electronics and Measurements. A study of the basic principles of biomedical electronics and measurements with emphasis on the operational performance and selection of transducers, instruments, and systems for biomedical data acquisition and processing. Selected laboratory work emphasizes the measurements of specific physiological events. Prerequisite: Electrical Engineering 61. Two courses. *Hammond, Thurstone, or von Ramm*

171. Signals and Systems. Convolution, deconvolution, Fourier series, Fourier transform, sampling, and the Laplace transform. Continuous and discrete formulations with emphasis on computational and simulation aspects and selected biomedical examples. One course. *Pilkington*

191, 192. Projects in Biomedical Engineering. For seniors who express a desire for such work and who have shown aptitude for research in one area of biomedical engineering. Half course to two courses. *Staff*

201. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Students choose a relevant topic area for detailed study and report. Not open to students who have taken Biomedical Engineering 101 or equivalent. One course. *Plonsey*

202. Biomedical Transfer Processes. An introduction to biomedical diffusion and momentum transfer processes with particular emphasis on physical models of biological and artificial organ systems. One course. *Clark and Hochmuth*

204. Measurement and Control of Cardiac Electrical Events. Design of biomedical devices for cardiac application based on a review of theoretical and experimental results from cardiac electrophysiology. Evaluation of the underlying cardiac events using computer simulations. Examination of electrodes, amplifiers, pacemakers, and related computer apparatus. Construction of selected examples. Prerequisites: Biomedical Engineering 101 and 163 or equivalents. One course. *Barr*

205, 206. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects, including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and

correct faults, and final design evaluation. Evaluation includes examination of complexity, reliability, and cost. Design and construction oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. Prerequisites for 205: Engineering 51 and Biomedical Engineering 163, 164 or equivalents; for 206: satisfactory work in 205. Two courses. *Barr, Hammond, and von Ramm*

211. Theoretical Electrophysiology. Mathematical analysis of intracellular and extracellular currents and voltages arising from subthreshold and transthreshold stimuli applied to excitable tissue (cardiac and striated muscle and nerve). Bases for and behavior of models of cardiac tissue utilizing discrete and continuous formulations. Evaluation of sources of extracellular fields. Description and evaluation of models of membrane behavior. Laboratory exercises based on computer simulation, with emphasis on quantitative behavior and design. Readings from original literature. Prerequisite: Biomedical Engineering 101 or 201. One course. *Plonsey and Barr*

212. Theoretical Electrocardiography. Mathematical analysis of currents flowing between the cardiac and body surfaces. Consideration of cardiac models, inhomogeneities, and surface lead systems. Examination of lead systems, and the interpretation of body surface measurements using inverse calculations. Laboratory exercises based on computer simulation with emphasis on quantitative behavior and design. Readings from original literature. Prerequisite: Biomedical Engineering 101 or 201. One course. *Barr and Plonsey*

215. Biomedical Materials and Artificial Organs. Chemical structures, processing methods, evaluation procedures, and regulations for materials used in biomedical applications. Applications include implant materials, components of ex vivo circuits, and cosmetic prostheses. Primary emphasis on polymer-based materials and on optimization of parameters of materials which determine their utility in applications such as artificial kidney membranes and artificial arteries. Prerequisite: Engineering 83 or Chemistry 151 or consent of instructor. C-L: Mechanical Engineering 215. One course. *Clark*

222. Principles of Ultrasound Imaging. Propagation, reflection, refraction, and diffraction of acoustic waves in biologic media. Topics include geometric optics, physical optics, attenuation, and image quality parameters such as signal-to-noise ratio, dynamic range, and resolution. Emphasis is placed on the design and analysis of medical ultrasound imaging systems. Prerequisites: Physics 52 and Mathematics 111. One course. *von Ramm*

230. Biomechanics. Basic elements of mechanics are developed with application in biomechanics. Primary emphasis is given to trauma mechanisms, injury criteria, and human protection. Head and neck injuries and helmet design are discussed. Case studies from product liability lawsuits with a strong biomechanics context are discussed in a seminar mode. One course. *McElhanev*

233. Modern Diagnostic Imaging Systems. The underlying concepts and instrumentation of several modern medical imaging modalities. Review of applicable linear systems theory and relevant principles of physics. Modalities studied include X-ray radiography (conventional film-screen imaging and modern electronic imaging), computerized tomography (including the theory of reconstruction), and nuclear magnetic resonance imaging. Prerequisite: consent of instructor. One course. *Riederer*

235. Acoustics and Hearing. The generation and propagation of acoustic (vibrational) waves and their reception and interpretation by the auditory system. Topics under the heading of generation and propagation include free and forced vibrations of discrete and continuous systems, resonance and damping, and the wave equation and solutions. So that students may understand the reception and interpretation of

sound, the anatomy and physiology of the mammalian auditory system are presented; and the mechanics of the middle and inner ears are studied. Prerequisites: Physics 52 and Mathematics 111 or equivalents. One course. *Miller*

243. Computers in Biomedical Engineering. An in-depth study of the use of computers in biomedical applications. Hardware, software, and applications programming. Data collection, analysis, and presentation studied within application areas such as monitoring, medical records, computer-aided diagnoses, computer-aided instruction, M.D.-assistance programs, laboratory processing, wave form analysis, hospital information systems, and medical information systems. One course. *Hammond*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Prerequisite: consent of instructor. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

207. Experimental Mechanics

221. Electrophysiological Techniques

THE MAJOR

The major requirements are included in the minimum total of thirty-two courses listed under general requirements and departmental requirements. The following specific courses must be included: Biomedical Engineering 101, 110, 132, 163, and 164.

Civil and Environmental Engineering (CE)

Professor Melosh, *Chairman*; Professor Utku, *Director of Undergraduate Studies*; Professors Muga, Vesilind, and J. F. Wilson; Associate Professors Biswas, Bryers, Medina, Peirce, and Petroski; Assistant Professors Arges, Marin, Pas, and Reckhow; Adjunct Professor Saibel

Civil engineering involves the conception, design, analysis, and building of constructed facilities. Modern civil engineers may find themselves engaged in such complex problems as safety of power plants, environmental planning for a community, designing an interplanetary vehicle, or optimizing an urban transportation system. There are seven major speciality areas of civil engineering at Duke. Environmental engineering deals with the quality of human environment as affected by water supply and wastewater treatment and disposal. Geotechnical engineering is concerned with interaction between engineering structures and the earth's crust as well as with structures constructed of earth as a material. Mechanics and materials engineering is the study of the behavior of materials under various conditions of loading and environment. Ocean engineering deals with the development and use of marine resources. Structural engineering is concerned with economical and safe design of engineering structures. Urban engineering encompasses a broad spectrum of integrated technological problems such as land and city planning and development, mass transportation, and public health and safety. Water resources engineering is concerned with the usage, preservation, and replenishment of water resources. In addition, a student may elect a general program of civil engineering studies. The student may also pursue a degree with a double major in civil engineering and the policy sciences, by additionally satisfying the requirements of the Department of Public Policy Studies.

The civil engineering program at Duke is supported by several laboratories for instruction and research. The structural engineering laboratory has universal testing

machines with capacities to 400,000 pounds; hardness testers; and machines for testing torsion, fatigue, and impact. The department has facilities for the construction and testing of structural models, including electronic equipment for the measurement and recording of strains and displacements. The soil mechanics laboratory includes modern testing equipment and instruments, such as static and dynamic and model testing accessories, as well as a triaxial shear apparatus, designed for testing soil and rock at confining pressures up to 100,000 pounds per square inch. The fluid mechanics laboratory equipment includes a water wave flume with paddle-type variable frequency, constant amplitude, wave generator, and a variety of sensors. The sanitary engineering laboratory is equipped for determining the characterization of waters and wastewaters and for applying biological, chemical, and physical treatment methods to improve their quality. The materials laboratory deals with the physical properties and stress-deformation characteristics of bituminous mixtures and concretes. The department has a representative collection of modern surveying equipment.

16. Surveying for Engineers. Theory and application of measurements required for planning, design, and construction of engineered facilities. Transit-tape, electronic distance measurement, and stadia surveys; differential and profile leveling; traverse computations; topographic mapping. Laboratory included. Prerequisite: Mathematics 19. Half course. *Arges*

116. Transportation Engineering. The role and history of transportation. Introduction to the planning and design of links, vehicles, and terminals of all transportation modes. Principles of traffic engineering and route location and design. Planning studies and economic evaluation. Prerequisites: junior or senior standing and consent of instructor for nonengineering students. One course. *Pas*

122. Fluid Mechanics. Physical properties of fluids; fluid-flow concepts and basic equations; continuity, energy, and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications emphasizing real fluids. Selected laboratory work. Corequisite: Engineering 123. One course. *Medina or Muga*

123. Water Resources Engineering. Descriptive and quantitative hydrology, hydraulics of pressure conduits and measurement of flow, compound pipe systems, analysis of flow in pressure distribution systems, open channel flow, reservoirs and distribution system storage. Groundwater hydrology and well-hydraulics. Probability and statistics in water resources. Selected laboratory and field exercises, computer applications. Prerequisite: Civil Engineering 122. One course. *Medina or Muga*

124. Environmental Engineering. Qualitative and quantitative physical, chemical, and bacteriological characterization of water and wastewater. Introduction to water treatment processes and wastewater collection, treatment and disposal systems. Air pollution control; solid and hazardous waste management. Laboratory included. Field trips to be arranged. Prerequisite: Civil Engineering 123. One course. *Peirce or Vesilind*

127. Environmental Pollution Control. A study of the environmental causes and effects of air, land, and water pollution. Interactions between the environment and stresses to which it is subjected as a consequence of growth and concentration of populations and their increasing demands on natural resources. Solid waste, recycling, noise pollution, and environmental ethics. Not open to engineering majors. Prerequisite: junior or senior standing. One course. *Peirce or Vesilind*

131. Theory of Structures. Application of mechanics to the analysis of plane and space structures; a unified treatment of statically determinate and indeterminate structural systems. Prerequisites: Mathematics 103 and Engineering 75. One course. *Arges or Biswas*

133. Structural Design I. Nonhomogenous materials. Determination of physical and mechanical properties of construction materials. Theory and design of compres-

sion and flexural members. Emphasis on ultimate strength theory for concrete. Timber design using mechanical fasteners. Laboratory exercises include concrete aggregate evaluation, concrete mix design, and structural timber tests. Prerequisite: Civil Engineering 131. One course. *Biswas*

134. Structural Design II. Design in metals, primarily steel. Properties of materials as criteria for failure. Tension, compression, and flexural members. Bolted and welded connections, including eccentric connections. Built-up members. Design by elastic and plastic methods. Selected problems to include computations and drawings. Prerequisite: Civil Engineering 131. One course. *Biswas or Melosh*

139. Introduction to Soil Mechanics. Origin and composition of soils, soil structure. Flow of water through soils; capillary and osmotic phenomena. Soil behavior under stress; compressibility, shear strength. Elements of mechanics of soil masses with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. Laboratory included. Prerequisite: Civil Engineering 122. One course. *Staff*

141, 142. Special Topics in Civil Engineering. Study arranged on a special topic in which the instructor has particular interest and competence. Prerequisites: consent of instructor and Director of Undergraduate Studies. Half course or one course each. *Staff*

146. Professional Engineering. General topics related to the professional practice of engineering with emphasis on economic and legal aspects. Monetary basis for engineering decisions, economic alternatives; contracts, specifications, ethics; scheduling by the Critical Path Method. Presentation of student papers on current or unique engineering topics. Prerequisite: junior or senior standing in engineering. One course. *Staff*

197, 198. Projects in Civil Engineering. These courses may be taken by junior and senior engineering students who have demonstrated aptitude for independent work. Prerequisites: consent of instructor and Director of Undergraduate Studies. Half course or one course each. *Staff*

201. Advanced Mechanics of Solids. Tensor fields and index notation. Analysis of states of stress and strain. Conservation laws and field equations. Constitutive equations for elastic, viscoelastic, and elastic-plastic solids. Formulation and solution of simple problems in elasticity, viscoelasticity, and plasticity. One course. *Petroski*

204. Plates and Shells. Differential equation and extremum formulations of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian plates of isotropic and orthotropic material. Solution methods. Differential equation formulation of thin shell problems in curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution, and plates. Extremum formulation of shell problems. Solution methods. Prerequisites: Mathematics 111 and Engineering 75 or 135. One course. *Utku*

205. Elasticity. Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and plane problems by semi-inverse, complex potential, and variational methods. Three-dimensional problems. Prerequisite: Civil Engineering 201. One course. *Petroski*

212. Mechanical Behavior of Materials. Historical perspective on structural failure. Fracture mechanics and its application to brittle and ductile fracture, and fatigue in structural materials. Analysis of load spectra; fatigue crack growth calculations. One course. *Petroski*

215. Urban and Regional Systems Analysis. Identification, formulation, and solution of urban and regional systems problems. Models of population growth and distribution, spatial activity allocation models. Design and analysis of experiments for resource recovery, waste disposal, and transportation planning. Application of matrix algebra in the design and analysis of solid waste processing and resource recovery. Optimization of public service delivery systems, including solid waste collection and disposal, resource recovery, water supply systems, and transportation networks. Prerequisite: senior standing. One course. *Pas*

216. Transportation Planning and Policy Analysis. Issues in policy planning and decision making in urban and rural transportation systems. Transportation legislation. Public transportation alternatives with emphasis on public transit and paratransit solutions. Prerequisite or corequisite: Civil Engineering 116 or consent of instructor. C-L: Public Policy Sciences 254. One course. *Pas*

217. Transportation Systems Analysis. The transportation systems planning process. Quantitative analysis; mathematical modeling and computer simulation techniques for short- and long-range planning and evaluation of transportation systems. Corequisite: Civil Engineering 116. One course. *Pas*

218. Engineering Management and Project Evaluation. Statistical analysis and economics. Data organization, distributions, estimates of parameters, hypothesis testing, analysis of variance. Economic impact assessment, supply and demand forecasting, benefit/cost analysis, economic incentives, public and private finance, input/output analysis. Fulfills advanced technical elective for mechanical engineering majors. Prerequisite: senior standing in engineering. One course. *Peirce*

225. Dynamic Engineering Hydrology. Dynamics of the occurrence, circulation, and distribution of water; hydrometeorology, geophysical fluid motions. Precipitation, surface runoff and stream flow, infiltration, water losses. Hydrograph analysis, catchment characteristics, hydrologic instrumentation, and computer simulation models. Prerequisite: Civil Engineering 122. One course. *Medina or Muga*

227. Groundwater Hydrology and Contaminant Transport. Review of surface hydrology and its interaction with groundwater. The nature of porous media, hydraulic conductivity, and permeability. General hydrodynamic equations of flow in isotropic and anisotropic media. Water quality standards and contaminant transport processes: advective-dispersive equation for solute transport in saturated porous media. Analytical and numerical methods, selected computer applications. Deterministic versus stochastic models. Applications: leachate from sanitary landfills, industrial lagoons and ponds, subsurface wastewater injection, monitoring of groundwater contamination. Conjunctive surface-subsurface models. Prerequisite: Civil Engineering 123. One course. *Medina*

232. Reinforced Concrete Design. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, and shear and diagonal tension. Two-way slab and flat plate design. Prerequisite: Civil Engineering 133. One course. *Biswas*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. Prerequisite: Civil Engineering 133. One course. *Biswas*

234. Advanced Structural Design in Metals. Design of metal structures using limit-state theory. Critical review of the basis for Load and Resistance Factor Design (LRFD) specifications. Application to bridge, building, offshore and aerospace struc-

tures. Evaluation of contemporary structural systems for planning and preliminary design. Prerequisite: Civil Engineering 134. One course. *Biswas*

235. Foundation Engineering. An introduction to methods of analysis, design, and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration, excavation and bracing, drainage and stabilization, and underpinning. Foundation vibrations. Prerequisite: Civil Engineering 139. One course. *Staff*

241. Environmental Engineering Chemistry and Biology. Inorganic and organic chemistry including equilibrium concepts as applied to water and wastewater treatment. Basic biology and ecology of natural, polluted, and wastewater treatment systems. Concepts of metabolism, enzyme kinetics, and growth kinetics are stressed. Occasional laboratories to illustrate analytical methods and types of organisms in the environment. Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Bryers*

243. Unit Operations in Water Treatment. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Vesilind*

245. Pollutant Transport Systems. Distribution of pollutants in natural waters and the atmosphere; diffusive and advective transport phenomena within the natural environment and through artificial conduits and storage/treatment systems. Analytical and numerical prediction methods. Prerequisites: Civil Engineering 122 and Mathematics 111. One course. *Medina*

246. Water Supply Engineering Design. The study of water resources and municipal water requirements including collection reservoirs, transmission, treatment and distribution systems; methods of collection, treatment, and disposal of municipal and industrial wastewaters. The course includes the preparation of a comprehensive engineering report encompassing all aspects of municipal water and wastewater systems. Field trips to be arranged. Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Vesilind*

248. Solid Waste and Resource Recovery Engineering. Engineering design of resource recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Energy recovery and recycling processes. Application of systems analysis to collection of municipal refuse. Collection, treatment, and disposal of solid wastes from wastewater treatment. Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Vesilind*

249. Control of Hazardous and Toxic Waste. Solutions to industrial and municipal hazardous waste management problems. Handling, transportation, processing, storage and disposal technologies. Upgrading an abandoned disposal site. Economic and regulatory aspects. Case studies. Prerequisites: senior standing in engineering or natural sciences and consent of instructor. Fall semester. One course. *Peirce*

251. Systematic Engineering Analysis. Mathematical formulation and numerical analysis of discrete engineering systems with emphasis on theory of structures. Equilibrium and propagation problems in continuum; properties of these systems and their discretization by the trial functions with undetermined parameters. The use of weighted residual methods, finite elements, and finite differences. One course. *Utku*

254. Applications of Finite Element Analysis. Theory of element and material models; models of metals, rock, reinforced concrete, wood, glass, soil, water, and air; analyses of torsion members, shear walls, membranes, plates, shells, solids, and compound structural systems; analysis of soil-structure and fluid-structure systems; pre-

diction of field heating, seepage, and pollution. Prerequisite: Civil Engineering 251. One course. *Melosh*

258. Analysis of Dynamic and Nonlinear Behavior of Structures. Computation of nonlinear response by discretization; models for simulation of geometric, material, and boundary constraint nonlinearities; analysis of limit loads, bifurcations, and snap-through; simulation of super-elastic, plastic, visco-elastic, and slipping materials; prediction of collapsing, ballooning, gapping, metal forming, and welding behavior. Prerequisite: Civil Engineering 251. One course. *Melosh or Utku*

265. Advanced Topics in Civil Engineering. Opportunity for study of advanced subjects relating to programs within the civil engineering department tailored to fit the requirements of a small group. One course. *Staff*

280. Engineering Aspects of Physical Oceanography. Study of the dynamic ocean processes of concern to the design engineer. Hydrometeorology, surface wind distribution, mechanics of generation and propagation of surface water waves, theory of periodic waves (linear and nonlinear), wave spectral descriptive models, astronomical tides, storm surge, impulsively generated waves (tsunamis), and wind- and wave-induced forces on various obstructions. Attention is focused on hindcasting-forecasting techniques and selection of design (wave spectra) criteria in terms of specified risk levels. Prerequisite: senior or graduate standing in engineering or the physical sciences. One course. *Muga*

281. Experimental System Engineering. Formulation of experiments; Pi theorem and principles of similitude; data acquisition systems; static and dynamic measurement of displacement, force, and strain; interfacing experiments with digital computers for statistical data analysis; students select, design, perform, and interpret laboratory-scale experiments in areas of fluid systems including environmental and ocean engineering; and in solid systems including structural and basic material behavior. Prerequisite: senior or graduate standing in engineering or the physical sciences. One course. *J. F. Wilson*

282. Port, Harbor, and Coastal Engineering. An intensive study of the various types of marine and coastal structures and their functions. Procedures for developing preliminary design alternatives and final design selection will be illustrated via the case history approach. Structures to be considered include piers (solid and open faced), seawalls and bulkheads, breakwaters, jetties, groins, outfalls, pipelines, moored cable array systems, and floating terminals. Each case history will be followed from conception and initial planning through the design stage to construction and postproject evaluation. Normally, there will be an opportunity to participate in an ongoing project. Prerequisite: Civil Engineering 280. One course. *Muga*

283. Ocean System Dynamics. Formulation of dynamic models for discrete and continuous structures, normal mode analysis, deterministic and stochastic responses to shocks and environmental loading (earthquakes, winds, and waves), introduction to nonlinear dynamic systems, analysis and stability of structural components (beams and cables and large systems such as offshore towers, moored ships, and floating platforms). One course. *J. F. Wilson*

COURSES CURRENTLY UNSCHEDULED

202. Advanced Mechanics of Solids II

226. Operational Hydrology

236. Earth Structures

238. Rock Mechanics

239. Physical Properties of Soils

247. Air Pollution Control

THE MAJOR

The major requirements are included in the minimum total of thirty-two courses listed under the general requirements and departmental requirements. Specific courses which must be included are: Engineering 11 (half course), 24, 51, 75, 83, 123; Civil Engineering 16 (half course), 116, 122, 123, 131, 133, 134, and 139.

Electrical Engineering (EE)

Professor Casey, *Chairman*; Associate Professor Hacker, *Director of Undergraduate Studies*; Professors Fair, Joines, Kerr, Marinos, Nolte, Owen, Pilkington, Trivedi, Wang, and T. G. Wilson; Assistant Professors Carroll, Dugan, George, and Massoud; Adjunct Assistant Professors Derby, Goodwin, Pitt, and Strole; Visiting Professor Trickey

Electrical engineering is a broadly based discipline dealing with the processing, control, and transmission of information and energy by making use of electrical and electromagnetic phenomena.

The flexibility of the electrical engineering curriculum permits students to concentrate in such areas as computer engineering and digital systems, control systems, electronic circuits and microelectronics, signal processing and communications, and electromagnetic fields and microwaves. Students may also plan a double-major program with secondary concentration in such fields as computer science, biomedical engineering, physics, mathematics, history, public policy studies, and many others. Students with interests such as premedicine, prelaw, economics, art, music, psychology, and social systems can be accommodated within the curriculum through individually designed programs.

The various teaching and research laboratories in the department provide opportunities for laboratory and project work in areas such as electronics, digital systems, microelectronics and microprocessors, signal analysis and adaptive signal processing, power electronics, microwaves and microwave-matter interactions, and solid-state properties of materials. These laboratories are important to the undergraduate program since they permit students to become actively acquainted with the devices and techniques of modern electrical engineering through regularly scheduled experiments, independent projects, and occasionally, part-time assistance to faculty members engaged in research.

51, 52. Undergraduate Research in Electrical Engineering. An elective program in which undergraduate students participate in an ongoing program of research with electrical engineering faculty members. The research topic to be pursued by the student must be discussed with, and approved by, the faculty member who is to serve as the research supervisor prior to registration for the course. For sophomores only. Quarter course each. *Staff*

61. Introductory Circuits and Systems. Circuit principles for linear and nonlinear networks, common signal waveforms, natural and forced response of linear circuits. Circuits in the AC steady state. One-port and two-port network theorems, transfer functions, block diagrams, feedback. Semiconductor diodes, transistors, and integrated circuits. Prerequisites: Mathematics 32 and Physics 51. Fall and spring semesters. One course. *Staff*

62. Introductory Electronics and Energy Conversion. Amplifiers: biasing circuits, large-signal diode and transistor models, small-signal multistage and feedback amplifiers. Operational amplifiers and analog computers. Energy conversion via mag-

netic fields and circuits. Transformers, DC and AC machines, instrumentation, and automatic control. Prerequisite: Electrical Engineering 61. Spring semester. One course. *Staff*

101, 102. Undergraduate Research in Electrical Engineering. For juniors only. See Electrical Engineering 51, 52. Quarter course or half course each. *Staff*

103. Introduction to Nonlinear Network Theory. Introduction to theory and techniques for analysis and synthesis of nonlinear circuits. Characterization of 2-, 3-, and n-terminal nonlinear network elements. Laws for interconnecting elements and determining equilibrium equations. Operating points, driving-point and transfer-characteristic plots. Graphical and numerical analysis and synthesis of DC and AC nonlinear resistive functional networks. Nonautonomous first-order nonlinear networks, and autonomous second-order nonlinear networks. Some laboratory and computer simulations. Prerequisite: Electrical Engineering 61. Fall semester. One course. *Owen or T. G. Wilson*

112. Operational Methods in Electrical Engineering. Fourier series and transforms; spectral analysis applied to networks and modulation systems. Laplace transforms and transient response of systems; transfer functions, poles and zeros, stability. Introduction to Z-transforms and state variable models. Prerequisite: Electrical Engineering 61. Spring semester. One course. *Kerr or Wang*

132. Statistical and Computational Methods in Signal Processing. Introduction to fundamental concepts of signal processing for both deterministic and random discrete-time signals in noise. Difference equations, sampling theorem, Z-transforms, and spectral analysis. Detection and estimation of signals in noise. Some computer simulations. Prerequisite: Biomedical Engineering 171 or Electrical Engineering 112. C-L: Biomedical Engineering 132. Spring semester. One course. *Nolte*

142. Thermodynamics of Electrical Processes. A study of those aspects of classical and statistical thermodynamics that are essential for an understanding of the thermal properties of electrical materials and processes. Emphasis will be placed on the thermodynamics of metals, semiconductors, and superconductors. Prerequisites: Electrical Engineering 112 and Mathematics 104 or 111. Spring semester. One course. *Hacker*

143. Introduction to Electromagnetic Fields. Review of vector analysis. Introduction to Maxwell's equations. Electrostatic and magnetostatic fields and their sources. Electromagnetic power, energy, and the Poynting theorem. Prerequisites: Mathematics 104 or 111 and Physics 52. Spring semester. One course. *Hacker or Joines*

151, 152. Undergraduate Research in Electrical Engineering. For seniors only. See Electrical Engineering 51, 52. Quarter course or half course each. *Staff*

155, 156. Special Topics in Electrical Engineering. Study of selected topics in electrical engineering tailored to fit the requirements of a small group. Prerequisites: consent of instructor and Director of Undergraduate Studies. Half course or one course each. *Staff*

157. Introduction to Switching and Automata Theory. This course introduces techniques for the analysis and design of combinational and sequential networks. Discrete mathematical systems, elements of code theory, threshold logic, functional decomposition, minimum-complexity combinational and sequential networks, asynchronous and clocked sequential systems, iterative switching structures, Turing machines, fault diagnosis techniques. Selected laboratory work. Usually open to juniors and seniors. C-L: Computer Science 157. Fall semester. One course. *Carroll or Strole*

161. Electronic Circuits. Graphical and mathematical modeling of electronic devices such as diodes, and bipolar-junction and field-effect transistors; techniques for

the analysis and design of electronic circuits with emphasis on large-signal and small-signal methods; applications of these methods to particular circuits, including regulators, bias-point stability, amplifiers, and switching circuits; computer simulation of electronic circuits using SPICE. Three class sessions and one computation or laboratory session. Prerequisite: Electrical Engineering 112. One course. *George or Owen*

173, 174. Projects in Electrical Engineering. A course which may be undertaken only by seniors who are enrolled in the graduation with distinction program or who show special aptitude for individual project work. Prerequisite: consent of Director of Undergraduate Studies. Elective for electrical engineering majors. Half course to two courses each. *Staff*

185. Pulse and Digital Electronics. Generation and shaping of waveforms encountered in information processing systems, such as radar, computer, control, and instrumentation systems. Typical circuit functions included are linear and nonlinear wave shaping, pulse and time-base generation, time delay, counting, and gating. Emphasis on the application of semiconductor devices to the realization of circuit functions. Three class sessions and one computation or laboratory session. Prerequisite: Electrical Engineering 161. Spring semester. One course. *George*

186. Introduction to Electronic Communications. Spectral analysis and sampling of analog signals. Noise sources, narrow-band noise models, noise temperature of antennas and amplifiers. Information capacity of noisy channels. Compact codes; error detecting and correcting codes. AM, FM, pulse, and digital modulation and detection systems. Pulse code detection and matched filters. Examples from commercial broadcasting and television, Bell T-carrier, deep-space telemetry, and optical fiber communications. Prerequisites: Electrical Engineering 62 and 112 or equivalents. Spring semester. One course. *Kerr or Nolte*

196. Microwave Electronic Circuits. Microwave circuit analysis and design techniques. Properties of planar transmission lines for integrated circuits. Matrix and computer-aided methods for analysis and design of circuit components. Analysis and design of input, output, and interstage networks for microwave transistor amplifiers and oscillators. Prerequisite: Electrical Engineering 161 or equivalent. Spring semester. One course. *Joines*

199. Linear Control Systems. Analysis and design of feedback control systems. Block diagram and signal flow graph system models. Servomechanism characteristics, steady state errors, sensitivity to parameter variations and disturbance signals. Time domain performance specifications. Stability. Root locus, Nyquist, and Bode analysis; design of compensation circuits; closed loop frequency response determination. Introduction to time domain analysis and design. Prerequisite: Electrical Engineering 112 or consent of instructor. One course. *Kerr or T. G. Wilson*

202. Digital Communication Systems. Data communications and the transmission of information over noisy digital channels. Binary signaling via ASK, FSK, PSK. Time division multiplexing; telephone data systems; satellite television transmission. Effect of noise on coherent detection of digital signals; keying and pulse shaping techniques for reliable binary signaling; error detecting and correcting codes. Optimum digital receivers for noisy channels; error probabilities for optimum MAP receivers. Prerequisites: Electrical Engineering 186, and Mathematics 117 or 135 or Electrical Engineering 203, or permission of instructor. One course. *Kerr or Nolte*

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting

filters. Introduction to optimum signal detection and parameter estimation. One course. *Kerr, Nolte, or Wang*

204. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. Addressing structures and error recovery. Multivendor software compatibility. Economic tradeoffs. International standards. Prerequisites: Computer Science 154 and Electrical Engineering 157. C-L: Computer Science 204. One course. *Pitt*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection, and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. Prerequisite: Electrical Engineering 203 or consent of instructor. One course. *Nolte*

206. Digital Signal Processing. Introduction to the fundamentals of processing signals by digital techniques with applications to practical problems. Discrete time signals and systems, elements of the Z-transform, discrete Fourier transforms, digital filter design techniques, fast Fourier transforms, and discrete random signals. One course. *Nolte*

207. Fault-Tolerant Computer Systems. Test generation and diagnostic program development for detection and location of faults in digital networks, digital system simulation as a diagnostic tool for test generation and verification of the initial system design, design of self-checking and fault-tolerant digital systems, and effectiveness evaluation of various redundancy schemes and fault-tolerant computer architectures. C-L: Computer Science 207. One course. *Marinos*

208. Digital Computer Design. Structural organization and hardware design of digital computer systems. Arithmetic unit, switching matrices, memory organization, central processing unit (CPU), I/O unit, and microprogram control. Detailed design and simulation of a general-purpose computer system. Computer systems based on cellular structures, hardware compilers, and parallel processing architectures are also discussed. Prerequisite: Electrical Engineering 157 or consent of instructor. C-L: Computer Science 208. One course. *Marinos*

209. Microprocessor Fundamentals and Applications. Various state-of-the-art microprocessor chips and their associated instruction sets; microcomputer architectures; comparative study of various microprocessor designs; microprocessor-based system design illustrated by several carefully selected design projects. Prerequisites: Electrical Engineering 157 and consent of instructor. Fall semester. C-L: Computer Science 209. One course. *Marinos*

210. Introduction to VLSI Systems. A study of devices, circuits, fabrication technology, logic design techniques, and system architecture intended to provide the student with an understanding of the underlying physics and design techniques of VLSI systems. Students are required to complete the design of a digital subsystem in NMOS. Prerequisites: Electrical Engineering 157 and 216 or consent of instructor. Spring semester. One course. *Carroll*

211. Quantum Mechanics. Wave mechanics and elementary applications, free particle motion, Schrödinger equation, approximation methods. Fall semester. One course. *Staff*

213. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. C-L: Physics 185. One course. *Guenther or Hacker*

214. Introduction to Solid-State Physics. Discussion of solid-state phenomena including crystalline structures, thermal properties, free electron theory of metals, and band theory of semiconductors with emphasis on understanding the electrical, magnetic, and optical properties of solids. C-L: Physics 214. One course. *Hacker*

215. Semiconductor Physics. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include band theory and conduction phenomena; equilibrium and nonequilibrium charge carrier distributions; charge generation, injection, and recombination; drift and diffusion processes. Prerequisite: Electrical Engineering 211 or consent of instructor. One course. *Hacker or Casey*

216. Devices and Processing for Integrated Circuits. Basic operating concepts of the devices that are used in integrated circuits: Schottky-barriers, ohmic contacts, p-n junctions, bipolar transistors, and Si MOS capacitors and field-effect transistors. Device fabrication and processing will also be presented. Selected laboratory work. Fall semester. One course. *Casey*

218. Integrated Circuit Engineering. Basic processing techniques and layout technology for integrated circuits. Photolithography, diffusion, oxidation, ion implantation, and metallization. Design, fabrication, and testing of integrated circuits. Prerequisite: Electrical Engineering 216. One course. *Casey or Fair*

219. Digital Integrated Circuits. Analysis and design of digital integrated circuits. MOSFET and bipolar devices. SPICE models. Major logic families such as NMOS, CMOS, TTL, ECL, and I²L as well as regenerative logic circuits and memories. Circuit design considerations for LSI and VLSI. Selected laboratory exercises. Prerequisites: Electrical Engineering 157 and 216. One course. *Casey*

220. Integrated Circuit Fabrication Laboratory. An introduction to IC fabrication processes. Emphasis will be on Si wafer cleaning, lithography, chemical etching, thermal oxidation diffusion, and metallization (sputtering). Laboratory fabrication and characterization of basic IC elements (pn junctions, MOS capacitors, BJTs, and MOSFETs) and simple MOS and bipolar ICs (inverters and gates). One course. *Massoud*

224. Advanced Electronic Circuits. Application of discrete and integrated circuits in analog systems. A study of differential, operational, and other multistage amplifiers; frequency response, feedback, compensation techniques, and other topics. Some laboratory and computer simulation work. Prerequisite: Electrical Engineering 161 or equivalent. One course. *George*

234. Power Electronics: High-Power Circuits. Basic principles of analysis and design of electronic power control and conversion circuits with particular emphasis on thyristor (SCRs, TRIACs, etc.) circuits. Characteristics of high-power semiconductors, commutating circuits, AC voltage controllers, AC-to-AC controlled rectifiers, DC-to-DC converters, DC-to-AC inverters, AC-to-AC converters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. One course. *Owen and T. G. Wilson*

235. Nonlinear Magnetic and Semiconductor Power Converters. Nonlinear magnetic and semiconductor switching characteristics for transient and steady-state analysis of power electronic circuits. Design of saturable and nonsaturating magnetic devices. State-plane analysis of negative-resistance oscillators and self-oscillating inverters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. One course. *Owen and T. G. Wilson*

236. Energy-Storage Power Converters. Analysis and design of switch-mode electronic power converters utilizing energy-storage principles. Determination of large-signal and small-signal dynamic response and stability of closed-loop regulated converters. Extensive use of computer-aided analysis, design and measurement techniques. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. One course. *Owen and T. G. Wilson*

241. Linear Systems. Modeling of multiple input-output linear systems in the frequency and time domain. Matrix differential and difference equations and their solutions; state variables. Digital simulation of differential systems. Fourier analysis of signals and systems. Transform techniques applied to state variable models. State-space models of distributed systems. One course. *Kerr or Wang*

250. Introduction to Robotics. Fundamental notions in robotics, basic configurations of manipulator arm designs, coordinate transformations, control of robot actions, robot programming, artificial intelligence; machine vision, force, touch, and other sensory systems; selected laboratory assignments. Prerequisites: Electrical Engineering 112 and consent of instructor. One course. *Wang*

251. Pattern Classification and Recognition. Parameter estimation and supervised learning, nonparametric techniques, linear discriminant functions, clustering, language theory related to pattern recognition, examples from areas such as character and severe weather recognition, classification of community health data, recognition of geometrical configurations, algorithms for recognizing low resolution touch-sensor array signatures and 3-D objects. Prerequisite: consent of instructor. One course. *Wang*

252. Computer Systems Organization. C-L: Computer Science 252. One course. *Loendorf or Trivedi*

253. Industrial Robotics. Introduction to history, current status, and prospects of robotic devices and systems. Classical task performance characteristics. Programmability, adaptability, effectiveness, economics. Applications. Laboratory and plant tours. One course. *Staff*

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Prerequisites: approval of Director of Undergraduate Studies and of supervising instructor. One course. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, and force and energy relations. Three class sessions. Prerequisite: consent of instructor. One course. *Hacker or Joines*

272. Electromagnetic Communication Systems. Review of fundamental laws of Maxwell, Gauss, Ampere, and Faraday. Elements of waveguide propagation and antenna radiation. Analysis of antenna arrays by images. Determination of gain, loss, and noise temperature parameters for terrestrial and satellite electromagnetic communication systems. Prerequisite: Electrical Engineering 164 or 271. Spring semester. One course. *Joines*

273. Waves and Fields in Optoelectronics. Mathematical methods, physical ideas, and device concepts of optoelectronics. Maxwell's equations, and definitions of energy density and power flow. Transmission and reflection of plane waves at interfaces. Optical resonators, waveguides, fibers, and detectors are also presented. Prerequisite: Electrical Engineering 143 or equivalent. One course. *Joines*

COURSES CURRENTLY UNSCHEDULED

- 162. Electromechanical Energy Conversion
- 188. Electrical Energy Systems
- 217. Lasers
- 222. Nonlinear Analysis
- 226. Modeling and Computer-Aided Analysis of Electronic Systems
- 227. Network Synthesis
- 243. Advanced Linear Systems Theory

THE MAJOR

The major requirements are included in the minimum total of thirty-two courses listed under the general requirements and departmental requirements. The electrical engineering department requires the equivalent of four engineering design and eight engineering science courses. A list of the engineering design and engineering science content of all engineering courses may be obtained at the departmental office.

Mechanical Engineering and Materials Science (ME)

Professor Chaddock, *Chairman*; Professor Garg, *Director of Undergraduate Studies*; Professors Bejan, Cocks, Dowell, Gösele, Harman, Pearsall, and Shepard; Associate Professors Jones, Loendorf, Quinlan, Shaughnessy, and Wright; Assistant Professors Buzzard and Pouagare; Adjunct Associate Professor Sud

Mechanical engineering serves mankind as one of the fundamental professions in a modern technological society. Ranging from single components to extremely complex mechanical, hydraulic, pneumatic, or electrical systems, designs by mechanical engineers are as varied as the needs of people. Typical examples include turbines for power generation and automated factories for enhancing quality and productivity. But it is no longer adequate to consider only the obvious benefits and immediate costs; engineering solutions should encompass and respond to society's nontechnological concerns and needs as well. A modern engineering educational program must provide opportunities for students to study such disciplines as ethics, public policy, sociology, and psychology, and encourage the incorporation of those concerns in engineering solutions.

Historically, the available materials have limited the technological development of any age. The development of materials with particular combinations of mechanical, chemical, and electrical properties continues as a limiting step for technological advances on almost every engineering frontier. An especially crucial area requiring the skills of materials scientists and engineers is that of energy conversion. Needs exist not only in the overall production, distribution, and use of energy itself, but also in the development of less energy-consuming processes for the production of materials.

The undergraduate curriculum in mechanical engineering and materials science provides a broad base in the basic sciences and mathematics, engineering and materials sciences, analog and digital computation, mechanical design, systems theory, and computer-aided engineering which includes computer-assisted analysis, synthesis, and manufacturing. The search for solutions to society's problems also requires an engineer to interact with other professions and disciplines; to reach out for an understanding of the economic, social, health, and political consequences of engineering decisions. Elective opportunities in the social sciences, life sciences, and humanities help fill this need.

Undergraduate laboratories provide unique learning experiences and assist in the development of professional attitudes and approaches to typical engineering

problems. In the dynamics of machines laboratory, fundamentals of instrumentation and dynamic responses are introduced through simulation techniques. The materials laboratory has equipment for the synthesis and evaluation of metals, polymers, ceramics, and biomaterials. Experiments in the fluid mechanics and heat transfer laboratories relate velocity and temperature field measurements to fluid friction and heat exchange processes. In the computer-aided engineering laboratory, students learn and apply interactive computational procedures in support of geometric model definition and its graphical display. Advanced design students use the laboratory for projects which require the use of data base management concepts in support of interactive analysis and design methods.

Involvement with mechanical engineering and materials science goes beyond any specific technology, device, or system. Based on the curriculum, students experience the ways in which scientific knowledge can be utilized in the design and development of useful devices and processes. With the curriculum flexibility and the variety of course offerings, students can choose courses of study most suited to their aptitudes.

Students wishing to meet the requirements for graduation with distinction in mechanical engineering and materials science must satisfy the requirements specified in this bulletin under the section on honors. Additionally, the student must successfully complete a 200-level course in an area related generally with the central focus of the project. The 200-level course may be taken prior to, concurrent with, or subsequent to the work of the special project.

11, 12. Undergraduate Research in Mechanical Engineering. An elective program in which undergraduate students participate in an ongoing program of research with mechanical engineering faculty members. The research topic pursued by the student is arranged by mutual agreement between the student and the participating faculty member. For freshmen only. Quarter course each. *Staff*

102. Thermodynamics II. Review of the laws of thermodynamics and their relation to energy conversion. Statistical concepts of the second law. Properties of real gases, gas mixtures, and solids. Generalized thermodynamic relationships. Combustion, thermochemistry, and chemical equilibrium. Applications to combustion power cycles, propulsion, and heat pumping. Prerequisite: Engineering 101. One course. *Harman*

115. Failure Analysis and Prevention. A study and analysis of the causes of failure in engineering materials and the diagnosis of those causes. Elimination of failures through proper material selection, treatment, and use. Case histories. Examination of fracture surfaces. Laboratory investigations of different failure mechanisms. Prerequisites: Engineering 75 and 83 or consent of instructor. One course. *Jones, Cocks, Pearsall, or Shepard*

126. Fluid Mechanics. An introductory course emphasizing the application of the principles of conservation of mass, momentum, and energy to a fluid system. Physical properties of fluids, dimensional analysis and similitude, viscous effects and integral boundary layer theory, subsonic and supersonic flows, normal shock waves. Selected laboratory work. Corequisites: Engineering 101 and 123. One course. *Buzzard, Pouagare, or Shaughnessy*

140. Dynamics of Machines. Analysis of machines and mechanical devices to determine the motions resulting from applied loads as well as inputs required to produce specified motions; kinematic synthesis; study of vibrations in machinery; control of resonance, chatter, and noise. Prerequisites: Mathematics 111 and Engineering 123 and 130. One course. *Wright*

141. Mechanical Design. A study of the broad aspects of mechanical design starting with the creative process and considering the effects of economics, human factors, ethics, and prior art on design. Basic mechanical components such as gears, cams, bearings, springs, and shafts introduced in the discussions to promote familiarity with their design and application. Practice in the application of the design process through a term design project. Prerequisites: Mechanical Engineering 115 and 140. One course. *Loendorf or Wright*

150. Heat and Mass Transfer. A rigorous development of the laws of mass and energy transport as applied to a continuum. Energy transfer by conduction, in laminar and turbulent flow inside and outside of tubes, and by radiation. Application to heat exchangers, thermal power equipment, and heat transfer in the environment. Introduction to the principles of molecular diffusion and convective mass transfer. Use of the analogies between mass, momentum, and energy transfer in problem solving. Selected laboratory work. Prerequisites: Mechanical Engineering 126 and Mathematics 111. One course. *Bejan, Buzzard, or Chaddock*

153. Heating, Air Conditioning, and Refrigeration. Principles of thermodynamics, heat transfer, and fluid flow applied to comfort and industrial air conditioning. Cycles and equipment for heating, cooling, and humidity control. Air transmission and distribution. Modern vapor compression, absorption, and low temperature refrigeration cycles and systems. Prerequisite: Engineering 101. One course. *Staff*

165, 166. Special Topics in Mechanical Engineering. Study arranged on a special engineering topic in which the faculty has particular interest and competence as a result of research and professional activities. Prerequisites: consent of instructor and Director of Undergraduate Studies. Half course or one course each. *Staff*

183. Power Generation. Basic concepts of thermodynamics, heat transfer, and fluid flow applied to power generation processes. Nuclear reaction theory and reactor technology; fossil fuel combustion theory and modern boiler practice. Power plant ancillary equipment and processes. Design considerations and analyses include economic and environmental factors. One course. *Harman*

198. Projects in Mechanical Engineering. This course may be assigned by the Chairman of the department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. Prerequisites: *B* average and senior standing. Half course to two courses. *Staff*

202. Engineering Thermodynamics. General thermodynamic relationships and continuum properties of real substances. Availability and second law analysis of energy conversion processes. Low temperatures and the third law of thermodynamics. Reaction and multiphase equilibrium. Statistical thermodynamics of simple systems. One course. *Bejan or Harman*

205. Biochemical Engineering. Mathematical analysis of the effects of substrate concentration, pH, temperature, and chemical inhibitors on the rate and yield of biological processes. Enzyme kinetics. Kinetics of cell growth and metabolite production in batch and continuous culture. Design of bioreactors for microbial, mammalian, and plant cell culture. Prerequisite: Calculus and a course in microbial physiology or biochemistry. One course. *Quinlan*

206. Optimization of Bioprocess Kinetics. Concepts and mathematical modeling techniques needed to maximize the rates and yields at which cells produce biomass and metabolites. Prerequisite: Mechanical Engineering 205. One course. *Quinlan*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering dealing specifically with the structure and properties of polymers. Particular attention paid to recent developments in the processing and use of modern plastics and fibers. Product design considered in terms of polymer structures, processing techniques, and properties. One course. *Clark or Pearsall*

213. Advanced Materials Science. An in-depth study of current problems in materials applications conducted in a seminar format. Treatment will include thermal, electrical, optical, and magnetic properties of materials in terms of basic physical concepts. Intended to provide materials scientists and engineers with a theoretical basis for understanding and manipulating properties. Prerequisites: Engineering 83 and Mechanical Engineering 111 or 112. One course. *Cocks or Shepard*

214. Corrosion and Corrosion Control. Environmental aspects of the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. Prerequisite: Engineering 83. One course. *Cocks or Jones*

215. Biomedical Materials and Artificial Organs. C-L: Biomedical Engineering 215. One course. *Clark*

216. Materials Science and Solar Technology. All aspects of materials science as related to solar energy development. Emphasis is placed on photovoltaic materials and devices, including the relationship of conversion efficiency to material properties and solar cell design. One course. *Cocks*

217. Fracture of Engineering Materials. Conventional design concepts and their relationship to the occurrence of fracture. Linear elastic and general yield fracture mechanics. Microscopic plastic deformation and crack propagation. The relationship between macroscopic and microscopic aspects of fracture. Time dependent fracture. Fracture of specific materials. Prerequisites: Engineering 83 and Mechanical Engineering 115. One course. *Jones*

218. Thermodynamics and Thermokinetics of Materials. Thermodynamic and thermokinetic fundamentals and their application to materials problems such as alloying, solid solution formation, and mass transport. Topics covered include the laws of thermodynamics, reactions and reaction rates, Gibbs and Helmholtz free energy, chemical potential, phase equilibria in semiconductor and metallic systems, behavior of solutions, phase diagrams, activation energies, and the transport equations. One course. *Cocks, Jones, Pearsall, or Shepard*

219. Applied Surface Science: Crystal Growth and Analytical Techniques. Fundamentals of surfaces processes and particle-surface interactions. Topics covered include adsorption, accommodation, elemental sticking coefficients, adatom diffusion, nucleation, thin film vapor phase growth (MBE, CVD, sputtering, etc.), and surface spectroscopies (AES, XPS, RBS, SIMS, etc.). One course. *Staff*

221. Compressible Fluid Flow. Basic concepts of the flow of gases from the subsonic to the hypersonic regime. Effects of friction, heat transfer, and shock on one-dimensional inviscid flow. Potential theory, oblique shock waves, and special calculation techniques in two-dimensional flow. One course. *Buzzard, Pouagare, or Shaughnessy*

222. Heat Transfer. Analytical and numerical treatment of conduction heat transfer. Boundary layer treatment of convection heat transfer. Boiling and condensing heat transfer. Gas radiation. Selected engineering applications. Prerequisite: Mechanical Engineering 150. One course. *Buzzard or Chaddock*

223. Principles and Design of Heat Transfer Equipment. Application of theoretical and experimental developments in heat transfer to the design of heat exchangers. Study of fin shapes, finned passages, fouling factors, baffling, and other parameters of heat exchanger design. Analytical and numerical methods for design calculation illustrated with equipment, such as furnaces, recuperators, regenerators, solar collectors, condensers, and evaporators. Prerequisite: Mechanical Engineering 150. One course. *Bejan or Chaddock*

224. An Introduction to Turbulence. Flow instability and the transition to turbulence. Physical characteristics of turbulent flows, averaging, and the Reynolds equation. Turbulent transport and mixing length theories. The statistical description of turbulence, correlations, and spectra. Fourier transforms. Measurement techniques. One course. *Shaughnessy*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorems. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. One course. *Shaughnessy*

227. Advanced Fluid Mechanics. Flow of a uniform incompressible viscous fluid. Exact solutions to the Navier-Stokes equation. Similarity methods. Irrotational flow theory and its applications. Elements of boundary layer theory. Prerequisite: Mechanical Engineering 226 or consent of instructor. One course. *Shaughnessy*

230. Modern Control and Dynamic Systems. Dynamic modeling of complex linear and nonlinear physical systems involving the storage and transfer of matter and energy. Unified treatment of active and passive mechanical, electrical, and fluid systems. State-space formulation of physical systems. Time and frequency-domain representation. Controllability and observability concepts. System response using analytical and computational techniques. Lyapunov method for system stability. Modification of system characteristics using feedback control and compensation. Emphasis on application of techniques to physical systems. One course. *Garg or Wright*

234. Advanced Computer-Aided Engineering. Advanced concepts and practices of computer-aided engineering (CAE), which includes computer-aided design and computer-aided manufacturing (CAD/CAM). Emphasis on computer graphics, engineering data management, interactive programming, and integrated analysis/design. Students will develop interactive programs that integrate the above areas. Prerequisite: programming capability in Fortran. One course. *Loendorf*

235. Advanced Mechanical Vibrations. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques, transfer matrices applied to lumped and distributed systems, analytical and numerical methods of obtaining the pulse response of plane and three-dimensional multimass systems, convolution and data processing, introduction to random vibration. One course. *Staff*

236. Engineering Acoustics and Noise Control. Specification of the physical properties of noise, noise measurement, and absorption, transmission, and propagation of sound. Effects of noise on people, noise exposure, and damage risk criteria. Legal aspects of noise control, source modification, enclosures, barriers, and personnel protectors. Prerequisites: Engineering 123 and Mathematics 111. One course. *Wright*

240. Patent Technology and Law for Engineers. The use of patents as a technological data base is emphasized including information retrieval in selected engineering disciplines. Fundamentals of patent law and patent office procedures. One course. *Cocks*

241. Advanced Mechanical Design. A study of those processes in mechanical design which occur after a prototype has been developed. Areas of study may include prototype testing and evaluation, computer analysis, marketing, CAD, redesign, detail drafting, manufacturing processes for mass production, economic analysis, patents, and entrepreneurial activities. Semester projects using design teams will be used to study these areas. Prerequisite: Mechanical Engineering 141. One course. *Staff*

242. Data Base Methodology. Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Prerequisites: Computer Science 154 and either 155 or 163. C-L: Computer Science 241. One course. *Loendorf*

254. Solar Energy Thermal Processes. Solar radiation instrumentation, measurements, data, and estimation. Radiation heat transfer characteristics of opaque materials and partially transparent media. Performance and design calculations for flat-plate and focusing collectors. Thermal energy storage. Solar water heating and heating and cooling of buildings. Economics and life-cycle costing studies for solar installations. Survey of research, development, and demonstration projects on solar thermal processes. One course. *Chaddock*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. Prerequisite: approval of Director of Undergraduate or Graduate Studies. One course. *Staff*

277. Optimization Methods for Mechanical Design. Definition of optimal design. Methodology of constructing quantitative mathematical models. Nonlinear programming methods for finding "best" combination of design variables: minimizing steps, gradient methods, flexible tolerance techniques for unconstrained and constrained problems. Emphasis on computer applications and term projects. Prerequisite: consent of instructor. One course. *Wright*

COURSES CURRENTLY UNSCHEDULED

65. Introduction to Energy Technology

112. Polymer Science

156. Combustion Engines

210. Intermediate Dynamics

231. Systems Response and Control

232. Nonlinear Analysis

THE MAJOR

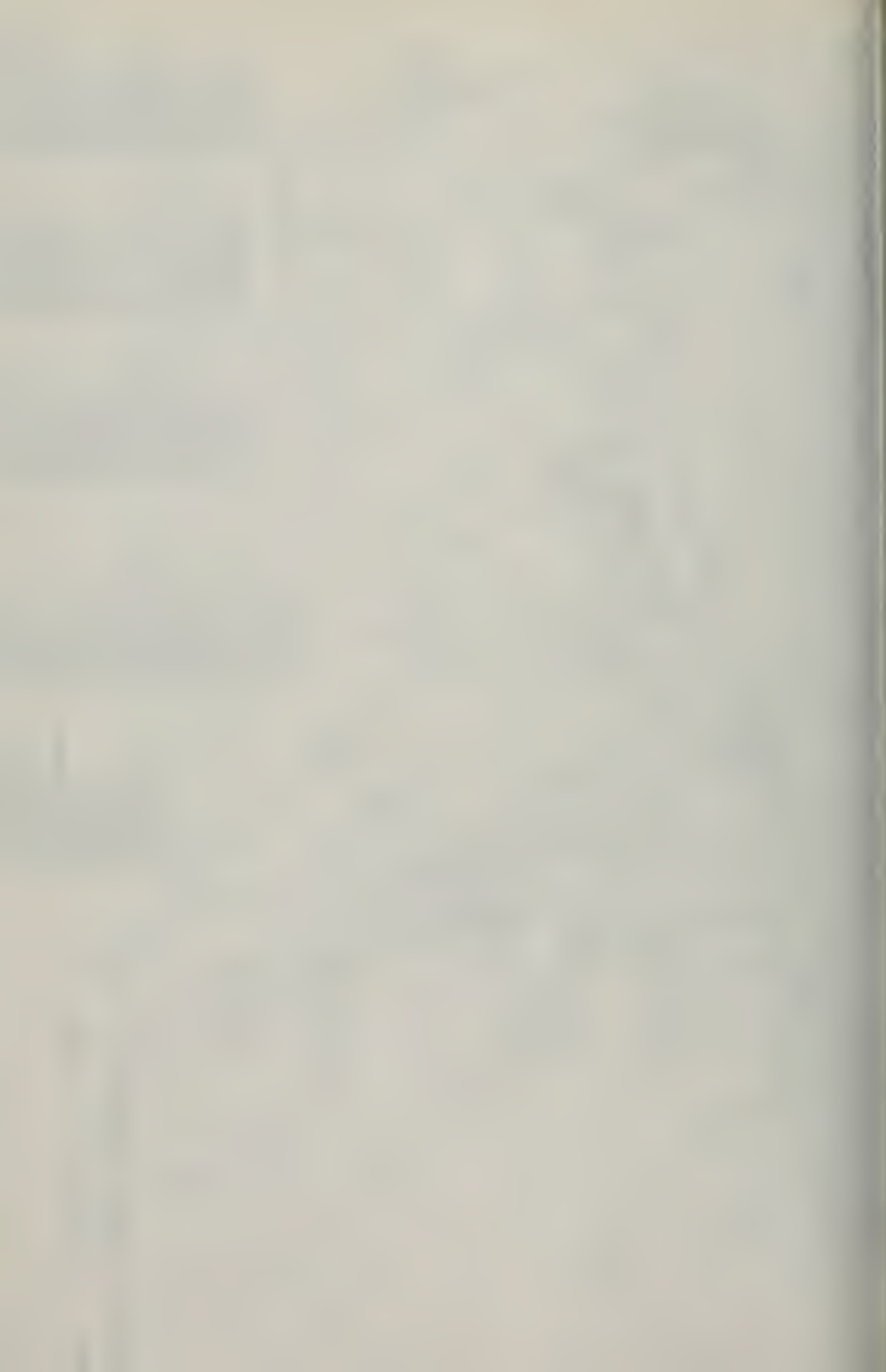
The major requirements are included in the minimum total of thirty-two courses listed under the general requirements and departmental requirements. Specific courses which must be included are Engineering 75, 83, 101, 123, and 130; Mechanical Engineering 115, 126, 140, 141, and 150.

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The information in the bulletin applies to the academic year 1985-86 and is accurate and current, to the best of our knowledge, as of February, 1985. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

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School of Medicine Calendar 1985-86

First Year (Freshmen) Students

1985

August	
16	Friday, 8:30 A.M.—Orientation
19	Monday, 8:00 A.M.—First day of academic year, 1985-86, begin fall term
September	
2	Monday—Labor Day holiday
November	
26	Wednesday, 6:00 A.M.—Begin Thanksgiving holiday
December	
2	Monday, 8:00 A.M.—Classes resume
20	Friday, 6:00 P.M.—End fall term

1986

January	
6	Monday, 8:00 A.M.—Begin spring term
March	
7	Friday, 6:00 P.M.—Begin spring vacation
17	Monday, 8:00 A.M.—Classes resume
June	
20	Friday, 6:00 P.M.—End spring term

Second Year (Sophomore) Students

Summer Term 1985

July	
22	Monday, 8:00 A.M.—Begin introduction to clinical medicine
August	
31	Saturday, 12:00 noon—End introduction to clinical medicine

Fall Term 1985

September	
3	Tuesday, 8:00 A.M.—Begin classes in section 81
October	
26	Saturday, 12:00 noon—End classes in section 81
28	Monday, 8:00 A.M.—Begin classes in section 82
November	
27	Wednesday, 6:00 P.M.—Begin Thanksgiving holiday
December	
2	Monday, 8:00 A.M.—Classes resume
21	Saturday, 12:00 noon—End classes in section 82

Spring Term 1986

January	
6	Monday, 8:00 A.M.—Begin classes in section 81
March	
1	Saturday, 12:00 noon—End classes in section 81
3	Monday, 8:00 A.M.—Begin classes in section 82
April	
15-16	Tuesday-Wednesday—Registration for fall term 1986
26	Saturday, 12:00 noon—End classes in section 82

Summer Term 1986

May	
5	Monday, 8:00 A.M.—Begin classes in section 81

June	
28	Saturday, 12:00 noon—End classes in section 81
30	Monday, 8:00 A.M.—Begin classes in section 82
July	
4	Friday—Independence Day holiday
August	
23	Saturday, 12:00 noon—End classes in section 82

Third Year (Junior) and Fourth Year (Senior) Students

Summer Term 1985

May	
6	Monday, 8:00 A.M.—Begin classes in sections 16, 81, 41
June	
1	Saturday, 12:00 noon—End classes in section 41
3	Monday, 8:00 A.M.—Begin classes in section 42
29	Saturday, 12:00 noon—End classes in sections 81, 42
July	
1	Monday, 8:00 A.M.—Begin classes in sections 82, 43
4	Thursday—Independence Day holiday
27	Saturday, 12:00 noon—End classes in section 43
29	Monday, 8:00 A.M.—Begin classes in section 44
August	
24	Saturday, 12:00 noon—End classes in sections 16, 82, 44

Fall Term 1985

August	
26	Monday, 8:00 A.M.—Begin classes in sections 16, 81, 41
September	
2	Monday—Labor Day holiday
21	Saturday, 12:00 noon—End classes in section 41
23	Monday, 8:00 A.M.—Begin classes in section 42
October	
19	Saturday, 12:00 noon—End classes in sections 81, 42
21	Monday, 8:00 A.M.—Begin classes in sections 82, 43
29-30	Tuesday-Wednesday—Registration for spring term 1986
November	
16	Saturday, 12:00 noon—End classes in section 43
18	Monday, 8:00 A.M.—Begin classes in section 44
27	Wednesday, 6:00 P.M.—Begin Thanksgiving holiday
December	
2	Monday, 8:00 A.M.—Classes resume
14	Saturday, 12:00 noon—End classes in sections 16, 82, 44

Spring Term 1986

January	
6	Monday, 8:00 A.M.—Begin classes in sections 16, 81, 41
February	
1	Saturday, 12:00 noon—End classes in section 41
3	Monday, 8:00 A.M.—Begin classes in section 42
March	
1	Saturday, 12:00 noon—End classes in sections 81, 42. Begin spring vacation
10	Monday, 8:00 A.M.—Classes resume. Begin classes in sections 82, 43
11-12	Tuesday-Wednesday—Registration for summer term 1986
April	
5	Saturday, 12:00 noon—End classes in section 43
7	Monday, 8:00 A.M.—Begin classes in section 44
15-16	Tuesday-Wednesday—Registration for fall term 1986
May	
3	Saturday, 12:00 noon—End classes in sections 16, 82, 44
3-4	Saturday-Sunday—Graduation activities

Summer Term 1986

May

5 Monday, 8:00 A.M.—Begin classes in sections 16, 81, 41
31 Saturday, 12:00 noon—End classes in section 41

June

2 Monday, 8:00 A.M.—Begin classes in section 42
28 Saturday, 12:00 noon—End classes in sections 81, 42
30 Monday, 8:00 A.M.—Begin classes in sections 82, 43

July

4 Friday—Independence Day holiday
26 Saturday, 12:00 noon—End classes in section 43
28 Monday, 8:00 A.M.—Begin classes in Section 44

August

23 Saturday, 12:00 noon—End classes in sections 16, 82, 44



University Administration

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Phillip A. Griffiths, Ph.D., *Provost*
William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
Eugene J. McDonald, LL.M., *Senior Vice-President*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Development and Alumni Affairs*
William L. Green, Jr., A.B., *Vice-President for University Relations*
Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
Roger L. Marshall, A.B., *Secretary of the University*
Andrew G. Wallace, M.D., *Vice-Chancellor for Health Affairs*
Joel L. Fleishman, LL.M., *Vice-Chancellor*
Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
R. James Henderson, M.Ed., *Associate Vice-President and Business Manager*

Medical Center Administration

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Office of Medical and Allied Health Education

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Suydam Osterhout, M.D., Ph.D., *Associate Dean, Admissions*
Roy T. Parker, M.D., *Director, Continuing Medical Education*
John L. Weinerth, M.D., *Director, Graduate Medical Education*
William D. Bradford, M.D., *Associate Dean, Undergraduate Medical Education*
Galen S. Wagner, M.D., *Associate Dean, Undergraduate Medical Education*
Shirley K. Osterhout, M.D., *Assistant Dean for Student Affairs*
Charles B. Johnson, Ed.D., *Associate University Registrar and Assistant Dean, Academic Affairs*

Office of Duke University Hospitals

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William J. Donelan, M.S.M., *Director and Chief Operating Officer*
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John Weinerth, M.D., *Associate Director, House Staff Affairs*
Ms. Phyllis Ellenbogen, *Executive Assistant to the Chief Executive Officer*

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Rachel Booth, R.N., Ph.D., *Assistant Vice-President for Health Affairs and Dean of Nursing*
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Admissions—Medical School

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Clinical Chairman of each clinical service and head of each division in service

Brain Death

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Clinical Cancer Education Program

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Clinical Investigations

Jerome Harris, M.D., *Chairman*; Joseph C. Farmer, Jr., M.D., *Vice-Chairman*; Barbara Echols, *Cochairperson*; Drs. Back, Bradford, Cobb, Foulks, Fox, Gockerman, Killam, Lockhead, Rhoads, Semans, Workman; Chaplain Aitken; Ms. Diosey, Long, Wilkins; Mr. Golson; *Consultants*: Dr. Grufferman; Ms. Gilbert, Perry; Mr. Drew; *Alternates*: Drs. Campbell, Camporesi, Faletta, Kay, Killenberg, Mahorney, Reiner, Shields, Wilkinson, Ms. McIntire, Chaplain Keese; *Student Representatives*: Messrs. Barton and Howard

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Medical Student Research Scholarship

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Merit Scholarship

Arthur C. Christakos, M.D., *Chairman*; Drs. Fridovich, Suydam Osterhout, Rhoads, and Sabiston

North Carolina Residence

Suydam Osterhout, M.D., Ph.D., *Chairman*; Drs. Clapp, C. Johnson, and Peete

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Research Award

F. Stephen Vogel, M.D., *Chairman*; Drs. Fridovich, Gallagher, Metzgar, Schanberg, Semans, and Spach

Study Away Committee

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Veterans Administration Research and Development

Harvey J. Cohen, M.D., *Chairman*; Drs. Cavenar, Cobb, Duncan, Feussner, Grant, Halvorsen, Lowe, Postlethwait, Roggli, Sage, Shelburne, Shipley, and Yarger, Ms. McVey

Chancellor's Veterans Administration

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General Information



History

I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines is, next to religion, the greatest civilizing influence.

I have selected hospitals as another of the principal objects of this trust because I recognize that they have become indispensable institutions, not only by way of ministering to the comfort of the sick, but in increasing the efficiency of mankind and prolonging human life . . .

James Buchanan Duke, Indenture of The Duke Endowment, 1924

By establishing the Duke Endowment, James Buchanan Duke expressed his hope that adequate and convenient hospital care would become available to all Americans. His further bequests provided for the opening, in 1930, of the School of Medicine, School of Nursing, and hospital which today are the core institutions of the Duke University Medical Center. By opening the first major outpatient clinics in the region in 1930, Duke recognized its responsibility for providing quality care to the people of the Carolinas. The Private Diagnostic Clinic, organized in 1932, not only provided coordinated medical and surgical care to private patients with moderate incomes but also allowed members of the medical faculty to contribute a portion of their earnings toward the continued excellence of medicine at Duke. In less than five years Duke was ranked among the top 25 percent of medical schools in the country by the Association of American Medical Colleges.

Building on this heritage, the Duke University Medical Center ranks among the outstanding health care centers of the world. Its pioneering medical curriculum, instituted in 1966, features a generous measure of elective course selection in the belief that all health professionals must be prepared for a lifetime of self-education. The scientific grounding for that education is provided through participation in a wide variety of ongoing research programs. The opening of Duke Hospital North in 1980 makes the Duke Hospital, with 1,008 beds, one of the most modern patient care facilities anywhere available. The combined strength of its teaching, research, and hospital care programs represents the continuing fulfillment of the dream of James Buchanan Duke.

Over the years the Medical Center has been enlarged and its programs expanded by new construction and by the acquisition of, and affiliation with, established hospitals.

Currently the Medical Center at Duke University occupies approximately 140 acres on the West Campus. The southern quadrant is contiguous with the main quadrangle of the University and consists of the following: *Davison Building*—Department of Pathology, Central Teaching Facility, Division of Audiovisual Education, Medical Center Administration, Student Lounge, School of Medicine, Office of Admissions,

and departmental research laboratories and offices. *Duke Hospital South*—inpatient care units, in- and outpatient diagnostic, treatment and support services including operating rooms, recovery room and laboratories, proton emission tomography imaging, nursing service administration, amphitheater, chapel, private diagnostic clinics, outpatient clinics, departmental offices; *Baker House*—Departments of Medicine, Anesthesiology, Obstetrics and Gynecology, outpatient diagnostic, treatment and support services including speech and hearing, and pastoral care and counseling; *Barnes Woodhall Building*—inpatient care units, in- and outpatient diagnostic, treatment and support services including labor and delivery room and radiology, hospital administration, Department of Radiology, departmental offices; *Diagnostic and Treatment Building*—clinics, in- and outpatient diagnostic, treatment and support services, departmental research laboratories and offices; *Gerontology Building*—Center for the Study of Aging and Human Development, treatment and support services, departmental research laboratories and offices; *Eugene A. Stead Building (CR-1)*—inpatient care unit (research), departmental research laboratories and offices; *Clinical Research II*—hyperbaric medicine unit, departmental research laboratories and offices, clinical cancer research unit and the Department of Psychiatry; *Edwin A. Morris Clinical Cancer Research Building*—Inpatient care unit (research), clinics, diagnostic treatment and support services including Division of Radiation Oncology, departmental research laboratories and offices.

The northern quadrant has the following buildings: *Nanaline H. Duke Medical Sciences Building*—Departments of Biochemistry, Physiology, and Pharmacology; *Alex H. Sands Medical Sciences Building*—Department of Anatomy and basic science research programs of the Departments of Medicine, Surgery, Psychiatry, and Anesthesiology; *Edwin L. Jones Basic Cancer Research Building*—Director of Comprehensive Cancer Center, Department of Microbiology and Immunology and basic science research programs of Medicine, Surgery, Pediatrics, Obstetrics-Gynecology, Anatomy, and Pathology; *Medical Research Building*—offices and laboratories of Radiology; *Bell Building*—offices and laboratories of Medicine, Surgery, Pediatrics, Radiology, Anatomy, and Ophthalmology. It also houses Information Services, and the gross anatomy laboratories; *Seeley G. Mudd Communications Center and Library*—Medical Center Library, the Trent Collection of the History of Medicine, the Department of Public Relations, and the Searle Center for Continuing Education; *Eye Center*—inpatient care units, eye clinic, diagnostic, treatment and support services including operating rooms, recovery, Department of Ophthalmology, departmental research laboratories and offices; *Duke Hospital North*—inpatient care units, diagnostic, treatment, and support services including operating rooms and recovery, Radiology, nuclear magnetic resonance imaging (NMR), laboratories, Departments of Medicine, Surgery, Pediatrics, and Anesthesiology departmental offices.

In the western quadrant of the campus are: *Research Park Buildings I, II, III, and IV*—offices and laboratories of Medicine, Surgery, Pediatrics, Radiology, Microbiology and Immunology; *Vivarium*—Division of Laboratory Animal Resources and laboratory animal care facilities; *Animal and Laboratory Isolation Facility*—special containment facility for cancer research.

In the eastern quadrant of the campus are: *Pickens Rehabilitation Center*—general and rehabilitation outpatient clinics; Student Health Service, Employee Health Service, and Faculty Family Health Service; *Civitan Mental Retardation and Child Development Center*—offices, clinics, and laboratories of Psychiatry and Pediatrics; *Trent Drive Hall*—Health Administration and Department of Community and Family Medicine.

The goal of the Duke University Medical Center is to be a leader in contemporary medicine. This involves maintaining superiority in its four primary functions—unexcelled patient care, dedication to educational programs, national and international distinction in the quality of research, and service to the region.

Growth is identified with deeper involvement in the social aspects of health, the establishment of advanced therapeutic and research facilities, and a medical teaching program that has attracted the attention of educators around the world.

Resources for Study

Library/Communications Center. The Medical Center Library/Communications Center is located in the Seeley G. Mudd Building, midway between the north and south Medical Center campuses.

The Medical Center Library attempts to provide all informational services and collections necessary to further educational, research, and clinical activities in the medical field. The collection of approximately 205,000 volumes and 2,650 current journal subscriptions is freely available for use by Medical Center students and personnel; study accommodations for 500 readers includes extensive provisions for audiovisual learning. The library also includes the Trent Collection which is unsurpassed in the southeast as a resource for study of the history of medicine, and a branch collection of books and journals maintained in the Nanaline B. Duke Medical Sciences Building.

The Medical Center Library is open: Monday-Friday, 8:30 A.M.-midnight; Saturday, 8:30 A.M.-6:00 P.M.; Sunday, 12:00 noon-midnight. Summer and holiday hours are as announced.

Director: Warren P. Bird, M.S. (Columbia, 1964), *Associate Professor of Medical Literature*; Curator of the Trent Collection: G.S.T. Cavanagh, B.S., B.L.S. (McGill, 1951), *Professor of Medical Literature*.

The Medical Center Bookstore offers a wide selection of biomedical textbooks and reference books, as well as an assortment of laboratory and clinical instruments and office supplies. Facilities for browsing in a pleasant atmosphere are available, as are special individualized services. The Bookstore is open: 8:30 A.M.-5:00 P.M., Monday-Friday.

Manager: Gerry Johnson

The Searle Center for Continuing Education in the Health Sciences provides accommodations for conferences, symposia, lectures and meetings to support the Continuing Education activities of the Medical Center. Provisions have been made for banquet and food service arrangements to complement the meeting facilities.

Director: Ellen Rock

The Thomas D. Kinney Central Teaching Laboratory. The Thomas D. Kinney Central Teaching Laboratory, formerly the Central Teaching Facility, is located on the fourth floor of Davison Building where it provides laboratory, demonstration, and conference space for all courses taught in the basic sciences, with the exception of gross anatomy. A full-time staff maintains a wide range of equipment and provides supplies and services necessary for the teaching programs conducted in the facility, thus enabling the academic staff of each department to devote its efforts entirely toward the students.

Six unit laboratories, each accommodating twenty students, and a twelve-person M.D.-Ph.D. candidate laboratory are devoted to instruction for the first year. All first year medical students are given space in one of these laboratories for their own work which they maintain for the entire academic year. Three small laboratories are interspersed between the six unit laboratories and provide space for large pieces of equipment used in conjunction with exercises conducted in the unit laboratories. Space is also provided for small laboratory projects. Three large multipurpose laboratories can accommodate forty or more students each for a large variety of teaching exercises. Other areas include demonstration and conference rooms and a microscopy laboratory for advanced courses offered during the third year.

The Central Teaching Laboratory also provides resources for allied health programs and a microscope cleaning service. Five large conference rooms in Duke South

and twelve conference rooms in Duke North are scheduled through this office, providing additional teaching space for groups of 16 to 225 persons when necessary.

Manager: Carol G. Reilly, B.S.

Division of Audiovisual Education. The Division of Audiovisual Education serves the Medical Center by providing all types of audiovisual support materials to assist the faculty. There are three sections: Medical Art, Medical Photography, and Central Television.

The Medical Art Section provides illustrations produced by various art methods and techniques. Services rendered are surgical and anatomic drawings, schematic and mechanical drawings, diagrams, charts, graphs, designs, lettering, calligraphy, signs, and poster exhibits, as well as other forms of illustrations. Computer generated graphics is the newest service from the Art section.

The Medical Photography Facility is staffed and equipped to provide a full range of photographic services for patient care, teaching, and research. Patient photography activity includes black and white and color photos in the studio, on the ward, in the clinic, or in the operating room. Copy photography includes a full range of slide services for internal and external lecture and presentation purposes. Black and white and color prints for publication, display and poster session purposes are also available. Other services include daily processing of Ektachrome film, location photography, and passport and application prints.

Central Television also supports teaching, research, and patient-care programs of the Medical Center. The three-fourths inch U-matic and one-half inch VHS video formats are used for color recording of patient education programs, lecture presentations, and surgical procedures as part of staff professional education. Motion pictures in color and with sound are also produced. Audiotape services, projectionists, and projectors are available.

Director: Thomas P. Hurtgen, M.B.A.

Duke Hospital. Duke Hospital, one of the largest private hospitals in the south, is part of the Medical Center and currently has 1,008 beds. The hospital directs its efforts toward the three goals of expert patient care, professional education, and service to the community. It offers patients modern comprehensive diagnostic and treatment facilities and special acute care and intensive nursing units for seriously ill patients. More than 30,000 patients are admitted annually. Surgical facilities include thirty-two operating rooms in which surgeons perform more than 16,000 operative procedures annually. Approximately 1,800 babies are born each year in the delivery suite. Other special facilities for patients include a heart catheterization laboratory, hemodialysis unit, cancer research unit, pulmonary care unit, hyperbaric oxygenation chamber, and cardiac care unit.

Close working relationships with private and governmental health and welfare agencies provide opportunities for continued care of patients after they leave Duke Hospital.

Ambulatory services include the nonprivate outpatient clinics, private diagnostic clinics, the employee health service, and the emergency department, with annual total patient visits of over 400,000. The clinical faculty of the Duke University School of Medicine participate in undergraduate and graduate medical education and practice medicine in the hospital and in private diagnostic clinics.

Duke Hospital, with a house staff of approximately 579, is approved for internship and residency training by the Council on Medical Education and Hospitals of the American Medical Association and is fully accredited by the Joint Commission on Accreditation of Hospitals.

Veterans Administration Medical Center. The Durham Veterans Administration Medical Center, with 489 beds, annually admits over 7,000 patients. The hospital is within walking distance from the School of Medicine and has closely integrated teach-

ing and training programs for medical students and house staff. These programs are provided by the full-time professional staff who are members of the faculty of Duke University School of Medicine.

Sea Level Hospital. Sea Level Hospital in Carteret County, North Carolina, became part of Duke University Medical Center in 1969 as a result of a gift by D. E. Taylor and family of West Palm Beach, Florida. The seventy-two-bed community hospital retains its professional and administrative staff, with representatives of the Medical Center serving in an advisory capacity. It provides an opportunity for medical students to obtain experience in the practice of medicine in a small community.

Lenox D. Baker North Carolina Crippled Children's Hospital. The Lenox D. Baker North Carolina Cerebral Palsy Hospital, with forty beds, is a residential rehabilitation center for children with neuromuscular and skeletal diseases, primarily cerebral palsy. Although it is a state institution, physicians on the faculty of the Duke University Medical Center conduct interdepartmental teaching and training programs for house staff, medical students, and the Cerebral Palsy Hospital staff.

Durham County General Hospital. Durham County General Hospital is a county owned, 483-bed, general, short-term care community facility serving the residents of Durham County. This institution participates in many of the medical and health-related professional training experiences.

Other Hospitals. Various cooperative teaching and training programs are available for medical and allied health professional students and house staff at other hospitals including McPherson Hospital in Durham, Asheville Veterans Administration Hospital in Buncombe County, Murdoch Center for Retarded Children and John Umstead Hospital in Butner, Dorothea Dix Hospital in Raleigh, and Cabarrus Memorial Hospital in Concord, North Carolina.

Program Information



The Medical Curriculum

In recent years, analysis and appraisal of medical curricula have resulted in changes in many medical schools. Several factors have required these changes. Important among them are the increasing scope and complexity of medicine generally and the dissatisfaction with the sharp cleavage between basic science and clinical years. As a result of long study, the Duke University School of Medicine instituted a major revision of the curriculum, beginning with the class which entered in the fall of 1966.

The aims of the present curriculum are: (1) to provide a strong academic basis for a lifetime of growth within the profession of medicine, with the development of technical competence, proficiency, and the proper attitudes peculiar to the practice of medicine as well as an appreciation of the broader social and service responsibilities; (2) to establish for the first year a basic science program which will fulfill the purposes of the increasingly heterogeneous student body; (3) to offer both clinical and basic science education simultaneously; (4) to permit the student to explore personal intellectual preferences and capabilities; (5) to allow indepth study in selected areas, either clinical or basic science; (6) to provide greater freedom of course selection and thus to encourage earlier career decision; and (7) to achieve better integration of the medical school curriculum with residency training and the practice of medicine.

The curriculum, while offering a previously unattainable degree of flexibility to medical education and new opportunities for intellectual exploration, also makes heavy demands upon the student. It should be recognized that medical students at the Duke University School of Medicine are expected to maintain a consistent level of performance and to demonstrate qualities of initiative and dedication to their chosen profession. A scholarly attitude toward medicine that will continue throughout an entire career is an important objective of the Medical School. The foundations of this attitude to learning should accompany the student upon entering.

Students are expected to maintain at all times a professional attitude toward patients, to respect confidences, and to recognize that they are the recipients of privileged information only to be discussed within the context of scholarship and in circumstances that truly contribute to the educational process or to the care of the patient. This attitude involves consideration not only of speech and personal appearance but *also of morality, honor, and integrity.*

Doctor of Medicine Degree

The degree of Doctor of Medicine is awarded, upon approval by the faculty of Duke University, to those students who have completed the curriculum of the School

of Medicine and have demonstrated their fitness to practice medicine by adherence to a high standard of ethical behavior and morality. Only those who have paid or made satisfactory arrangements to pay all indebtedness to the University will be awarded their degrees.

Course Requirements—First Year. The student will study the principles of all the basic science disciplines. Rather than mastering an encyclopedic array of facts, the purpose will be to acquire familiarity with the major principles of each subject. The year will be divided into two terms of instruction as follows:

Semester 1	Credit
Gross Anatomy	3
Microanatomy	3
Neuroanatomy	2
Biochemistry	5
Medical Physiology	4
Neurophysiology	2
Genetics	1
	<hr/> 20
Semester 2	Credit
Pathology	5
Microbiology	5
Pharmacology	4
Human Behavior	2
Immunology	1
	<hr/> 17

Following the first year, there is a mandatory vacation before beginning the Introduction to Clinical Diagnosis course during the third week of July. Every class has Labor day, Thanksgiving, Christmas, and spring break with the exact dates depending upon rotation and class schedules. Each class also has the possibility of summer vacation after each academic year.

Course Requirements—Second Year. Satisfactory completion of the first year curriculum is a prerequisite to the second year curriculum. The second year will provide an exposure to clinical science disciplines, which permits students early in their careers to become participants in the care of patients. The acquired appreciation of the problems of the clinical areas and the opportunities to recognize the applications of the basic sciences should lead to a more meaningful selection of courses for the subsequent two years.

The Introduction to Clinical Diagnosis course occupies the six weeks preceding the core clinical rotations. The balance of the second year consists of equal eight-week rotations. These rotations are offered in internal medicine, surgery, obstetrics/gynecology, pediatrics, psychiatry, and family medicine. Second year students are given the freedom to choose five of these six rotations. The sixth rotation may be taken without additional tuition if the student so chooses or it may be omitted entirely.

Course Requirements—Third and Fourth Years. Satisfactory completion of the second year curriculum is a prerequisite to the elective curriculum. These two years will be made up of elective courses, selected by the student within requisite limitations. Each student will choose professional advisers from the preclinical and clinical faculties to assist in formulating the program for the third and fourth years. Half of the time must be devoted to basic science and half to clinical science. Recipients of a Ph.D. degree in a basic science subject or completion of one of the special study programs may fulfill the requirements for basic science. Specific prerequisites for elective courses may be required.

The elective courses of study offered are described under each department. The wide selection affords an opportunity for students to design programs to best satisfy



their needs, with guidance from their advisers. Thirty-six credits in each elective curriculum, i.e., basic science and clinical science, are required for graduation.

As an alternative after completion of the second year, the student may enroll as a Ph.D. candidate in one of the basic sciences, earning this degree in two or three years. Then, having completed three of the four years necessary for a Doctor of Medicine degree, the student may earn that degree by completing a fourth clinical year.

The third and fourth years will be divided into four terms of sixteen weeks each. Certain courses as noted will be offered during the summer term.

Promotion. Where appropriate, certification by the individual faculty person or by the delegated representative of each departmental Chairman that a student has satisfactorily completed requirements for a course shall constitute grounds for a grade of "passing" or a grade of "passing with honors." "Passing with honors" is reserved for those students who have performed in an extraordinary manner in the opinion of the faculty.

An "incomplete" grade shall be reserved for those students who have not met all of the requirements because of illness or other such extenuating circumstances. "In-completes" that are not satisfied within one calendar year automatically become "failures." It is the departmental chairman's responsibility or that of the delegated representative of the departmental Chairman to certify that an "incomplete" has been satisfied and to so notify the Registrar and Dean for Undergraduate Medical Education. A "passing grade" shall be placed alongside an "incomplete" on the permanent and official transcript. All first year courses must be satisfactorily completed before a

student may enroll in second year courses. All second year courses must be satisfactorily completed before a student may enroll in the elective curriculum.

A "fail" grade is recorded on the permanent record of a student by the Registrar upon certification by the individual faculty person or the delegated representative of the departmental chairman that unsatisfactory work has been done in the opinion of the faculty. Failures cannot be erased from the permanent record but the requirements of the course may be satisfied by repeating the course in a satisfactory manner at which time a passing grade is placed alongside the grade of "fail" on the official and permanent transcript.

Each student's record will be reviewed periodically by promotions committees composed of the departmental chairmen or their designees. There will be two such committees: one for basic science and one for clinical science. Recommendations by these committees will be made to the Dean of Undergraduate Medical Education who may follow one of several options:

1. Promote students whose work is satisfactory;
2. Warn students whose work is less than satisfactory that they must improve their scholastic endeavor;
3. Place on probation students whose work is unsatisfactory; or
4. Request the resignation of any student who is considered an unpromising candidate for the degree of Doctor of Medicine.

A student wishing to appeal a decision may do so to the Dean of Undergraduate Medical Education within two weeks of notification.

The Dean of Undergraduate Medical Education, with the advice of the Medical School Advisory Committee, reserves the right to require the withdrawal of any student at any time if, in his opinion, the student should not continue in the School of Medicine.

Satisfactory Progress. Satisfactory progress for students in the School of Medicine shall be construed as the successful completion of all requirements necessary for the advancement from one year to the next. These requirements are as follows:

First to Second Year. Completion of core basic science courses in one calendar year.

Second to Third Year. Completion of core clinical science courses within fourteen months.

Third to Fourth Year. Completion of 36 elective course credits within one calendar year.

Fourth Year to Graduation. Completion of an additional 36 elective credits within one calendar year.

Leave of Absence. With the approval of the Dean or Associate Deans of Undergraduate Medical Education, or the Assistant Dean for Medical Student Affairs, a student may be granted an official leave of absence for two or more consecutive terms but not to exceed one calendar year. In the following circumstances a student must request a leave of absence: a freshman who will not be enrolled for the entire first year; a sophomore who will not be enrolled during an entire term and, thereby, not complete the core clinical science courses within fourteen months; and a third or fourth year student who will not be enrolled for consecutive terms in the fall, spring, and/or summer.

A student who does not enroll for a period longer than one year must seek readmission by application to the Medical School Admissions Committee.

Combined Degree Programs

Medical Scientist Training Program. The Medical Scientist Training Program is designed for highly qualified students strongly motivated toward a career in medical

sciences and academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the full clinical curriculum of the School of Medicine. The program requires, on the average, six to seven years of study and leads to both the M.D. and Ph.D. degrees. Although the special emphasis of this program is on basic medical science, the trainees, because of their education in clinical medicine, have a remarkable range of career opportunities open to them. Graduates of this program follow one of two broad paths. Some embark directly on careers in teaching and research in one of the basic medical sciences, while maintaining strong ties with clinical science as a result of their combined training. Others enter residency programs before pursuing investigative and teaching careers in clinical medicine, carrying with them strong academic backgrounds which allow them to conduct fundamental research with a foundation of superior training and experience in basic sciences.

Eligibility. Applicants must meet the admission requirements of both the Medical School as a candidate for the M.D. degree, and the Graduate School as a candidate for the Ph.D. degree. Most candidates apply for admission to the first year of the program, but in special cases applications can be accepted from students who are in residence in the Medical School or Graduate School of Duke University. In addition to the minimum requirements for acceptance to the Medical School and the Graduate School, advanced course work in science and mathematics and prior research experience (or other evidence of research aptitude) will count heavily in the selection of candidates.

Financial Support. Students admitted to the first year of the program will receive a traineeship award, consisting of a stipend and full tuition allowance, provided by a National Research Service Award from the National Institutes of Health. Currently the annual stipend, defined by NIH policy, is \$5,292, and financial support from that award can be furnished for up to six years, assuming normal progress. These six years need not be consecutive; this permits flexibility in funding in case more than six years are required for completion of the curriculum. Funding by the NIH is limited to citizens or permanent residents of the United States.

The Training Program. This program has been designed to offer trainees great latitude in the selection of course material. Basic requirements are two academic years composed of the first basic science year and the second clinical science year of the curriculum for medical students at Duke University. Following completion of the second year, the trainee enters the graduate program to complete the requirements for the Ph.D. degree. One more academic year of elective clinical study is necessary to complete the requirements for the M.D. degree. Both degrees are awarded at the completion of this sequence. Minor variations in this schedule can be arranged if this is advantageous to the student's education.

Year 1—Core Basic Science Year. This year consists of courses in anatomy, biochemistry, genetics, microbiology, pathology, pharmacology, and physiology. *Year 2—Core Clinical Science Year.* This year encompasses a comprehensive approach to medicine oriented to the patient as a whole. The year provides fundamental training in clinical medicine, with emphasis on the relationships between general biological processes, from conception through birth, development, and maturation to senescence and death, as well as individual clinical states. Special consideration is devoted to the pattern of developmental sequences and to the changes in that pattern determined by genetic composition and the particular environment in which the patient lives.

During the second year, the trainee is taught primarily by teacher-investigators from the clinical departments. The Introduction to Clinical Diagnosis course occupies the six weeks preceding the core clinical rotations. The balance of the second year consists of equal eight-week rotations. These rotations are offered in internal medicine, surgery, obstetrics/gynecology, pediatrics, psychiatry, and family medicine. Second year students are given the freedom to choose five of these six rotations. The sixth



rotation may be taken without additional tuition if the student so chooses or it may be omitted entirely.

Years 3, 4, 5, (6)—The Graduate Years. During the third, fourth, and fifth and, if necessary, sixth year of the program, the trainee pursues graduate study to satisfy the requirements for the Ph.D. degree. These requirements include: (1) completion of necessary course work, (2) adequate performance in the preliminary examination, (3) original research suitable for a dissertation, and (4) successful defense of the thesis in the final examination. Detailed description of the other general requirements for the Ph.D. degree are stated in the *Bulletin of the Graduate School*.

The graduate curriculum of each trainee is developed in consultation with the director of graduate studies of the department in which the trainee elects to study and requires the approval of the Medical Scientist Training Program Committee. Since most of the ordering ideas and experimental techniques of all the medical sciences derive from mathematics and the physical sciences, it is essential to ensure that all students in the program have an adequate foundation in these subjects. Because of the close working relationship and geographical proximity of the departments of medical and physical sciences at Duke, the setting is unusually favorable for the achievement of that goal.

Descriptions of the graduate courses in the Departments of Anatomy, Pathology, Microbiology, Biochemistry, Genetics, Physiology, Pharmacology, Biomedical Engineering, and Computer Science are listed in the *Bulletin of the Graduate School*. Trainees are encouraged to select courses which relate to their developing individual interests rather than follow a prescribed curriculum applied to all students in a given discipline. Such range, flexibility, and freedom are the essence of graduate education. The original research and dissertation of each trainee is supervised by a faculty adviser chosen by the trainee in consultation with the Director of Graduate Studies in the appropriate department. The faculty adviser is the chairman of the trainee's supervisory committee, which consists of at least three members from the major department. This com-

mittee generally administers the preliminary examination before the student commences original research and the final examination after the student completes the dissertation.

Final Year—An Elective Year in Clinical Science. In this year, which is entered only after completion of all requirements for the Ph.D. degree, a faculty adviser from the clinical discipline in which the student is most interested is assigned. The student and the adviser construct an individualized curriculum, which often places major emphasis on one clinical area and minor emphasis on other fields. One aim is the integration of research interests and clinical experience in such a way that the student's research competence will be facilitated; therefore, this year is planned with regard to the trainee's proposed career in research as well. This elective year provides further training in clinical medicine to complement the second or core clinical year, so that the trainee's total clinical experience is the same as that given in the regular clinical years of medical school (the third and fourth years in the majority of schools). It should be noted that since students in the program receive the M.D. degree upon completion of this final year, great care is taken by the faculty to ensure that students are competent and knowledgeable in current concepts of patient care. It is hoped that the final year will provide the student with an experience which is not repeated during the residency but will serve to complement later phases of training. Thus, future surgeons might be exposed to fields other than surgery, since they will receive intensive training in that discipline during their residency programs.

Application and Admission Procedure. The following guidelines should be observed by individuals applying to the Medical Scientist Training Program.

1. The application form for the Duke University School of Medicine should be completed and submitted as early as possible, since acceptance into the Medical Scientist Training Program requires acceptance by both the Program Committee and the Medical School Admissions Committee. Applicants who cannot be accepted into the program are still fully eligible for acceptance to the medical school if the Medical School Admissions Committee considers them qualified and desirable.
2. The application form for the Medical Scientist Training Program should be completed and submitted with the application to the School of Medicine. *To ensure full consideration by the Program Selection Committee, this application should be mailed no later than 1 November.*
3. To facilitate review of this application, the Medical College Admission Test should be taken, if possible, in May of the year in which the application is submitted.
4. Only those applicants who are accepted for the program are requested to complete an application form for the Graduate School. The Graduate Record Examination is not required for this purpose.
5. Applicants are notified about acceptance into the program on or about 15 February.

Additional information may be obtained by writing Henry Kamin, Ph.D., Professor of Biochemistry and Associate Director, Medical Scientist Training Program, Department of Biochemistry, Duke University Medical Center, Durham, North Carolina 27710.

The Medical Historian Program. The Medical Historian Program is conducted under the auspices of the School of Medicine and the Graduate School. Two courses are offered: a combined M.D.-Ph.D. (extending over six years) and a M.D.-M.A. (four or five years depending on use of summer sessions). The choice of Ph.D. or M.A. depends on the career goals of the student. Those wishing to put a major effort into scholarly activities in the history of medicine will generally be advised to undertake

the Ph.D. The M.A., taken separately from the M.D., will be attractive to physicians already in practice who wish to pursue an interest in the history of medicine more effectively.

The basic requirements for both courses are two academic years in the School of Medicine consisting of core basic sciences in the first year and core clinical rotations in the second year. The student then enters the Department of History. A range of appropriate courses are available. Following the completion of the Ph.D. or M.A., the student resumes requirements for the M.D. degree.

Application and Admissions Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Candidates who have completed two years of medical school will also be considered. In addition to the minimum requirements established by the School of Medicine and the Graduate School, courses in history and in the history and philosophy of science will count in the selection of candidates.

Applicants should complete and submit an application form to the Duke University School of Medicine. After acceptance, selected candidates will be requested to submit an application to the Graduate School for admission to the Department of History.

Additional information may be obtained by writing to the Director, Medical Historian Program, Box 3702, Duke University Medical Center, Durham, North Carolina 27710.

The Medicine and Public Policy Program. This program, which normally requires a maximum of five years to complete, is offered to meet the growing demand for persons who combine medical skills and training with a capacity for analytic public decision-making. It aims at training those persons with requisite talent to be leaders in the development and implementation of health policy at all levels of government. Such leadership might be provided as an elected or career public official, as a leader of medical professional organizations, or as a practicing physician or medical scholar active in public affairs.

Utilizing the faculty and resources of the School of Medicine and the Institute of Policy Sciences and Public Affairs, the program offers students a multidisciplinary education that aims at providing:

1. A complete course of study in basic medical sciences and clinical training in the practice of medicine identical in scope and rigor with the education received by students enrolled in the Doctor of Medicine program alone;
2. Familiarity with the organization and financing of health services, with particular focus on the economics and politics of health care;
3. An understanding of the political, bureaucratic, and social processes that define public problems and limit alternative approaches to their solutions;
4. A capacity for quantitative and logical methods of analysis useful in forecasting and appraising policy consequences and in evaluating existing policies;
5. An understanding of the uses and limitations of various analytic techniques and an awareness of the value considerations and ethical choices implicit in particular policy alternatives.

During the first two years at Duke, students enroll in the normal course of study in the School of Medicine. In the third year, course work shifts primarily to the Institute. In the fourth year, students do most of their work in the School of Medicine and complete a client-oriented study of a particular problem in health policy. During the fifth year, students complete their requirements in the School of Medicine, at the completion of which they receive both the M.D. and A.M. in public policy sciences degrees.

Admissions. Students may apply for admission to the program in medicine and policy sciences concurrent with application to the School of Medicine or during their first or second years.

Applications. Requests for applications and specific questions about the program should be addressed to the Director of Graduate Studies, Institute of Policy Sciences and Public Affairs, P.O. Box 4875, Duke Station, Durham, North Carolina 27706.

The M.D.-J.D. Program. The School of Medicine and the School of Law of Duke University jointly sponsor a program of combined medical and legal education. The program provides an opportunity to acquire a full basic study of the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.D. and the J.D. degrees.

Course of Study. The student in the M.D.-J.D. Program begins a six-year course of study in the School of Medicine. As in the regular M.D. Program, the first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point the student enters the School of Law, where the first-year curriculum is the same as that of other law students. During the next two years the student takes approximately one and one-half semesters in the law curriculum, including available health law courses, and then may apply up to twelve additional hours of medical school courses toward the law degree. The sixth and final year is spent in elective clinical work in the Medical School tailored to the student's specialized needs. In addition, the student completes eighteen semester hours, or two summer sessions, of elective basic science work.

Eligibility. Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. The usual approach is to apply for both schools simultaneously, thus reserving a place in the program prior to arrival. Applications are also accepted from members of the first and second year medical school class for admission to the School of Law and from the third year law school class for admission to the School of Medicine.

Application Procedure. Application forms for the School of Law may be obtained by writing to the Office of Admissions, Duke University School of Law, Durham, North Carolina 27706. Applications for the School of Medicine shall be made by utilizing the AMCAS procedure described in this bulletin.

Deadlines. For those seeking simultaneous admission to both schools: at the end of the junior year take the new Medical College Admissions Test (MCAT) and the Law School Aptitude Test (LSAT).

For the Medical School complete the AMCAS application procedures and upon receipt of the supplemental application form from Duke, check the box indicating "MD-JD Program." Deadline for AMCAS procedure is November 1. There is no deadline for the Law School but January or earlier submission is suggested.

The M.D.-M.P.H. Program. Students enrolled in the School of Medicine, after satisfactory completion of the first two years of the regular curriculum, may request approval to seek a Master of Public Health degree at the University of North Carolina, Chapel Hill, or at another approved institution. The program is designed to train physicians in epidemiology, biostatistics, environmental and occupational health, and in planning, administering, and evaluating health care delivery systems. Upon receipt of the M.P.H. degree, students are awarded one half year (18 units) of elective credit toward the M.D. degree. This credit award, to be made by the Dean for Undergraduate Medical Education, may be prorated between clinical and basic elective units depending upon the course of study pursued by the student.

For additional information, interested students should contact George R. Parkerson, Jr., M.D., M.P.H., Coordinator of Education, Department of Community and Family Medicine, Duke University School of Medicine, Durham, North Carolina 27710.

Commencement. Graduation exercises are held once a year, in May, when degrees are conferred on, and diplomas are issued to, those who have completed requirements by the end of the spring semester. Those who complete degree requirements at the end of the fall or summer terms receive diplomas dated 30 December or 1 September, respectively. There is a delay of about one month in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Postgraduate Education

Residencies. Appointments are from 1 July through 30 June with few exceptions. Residents receive stipends, professional liability insurance, disability insurance, life insurance, uniforms, and laundry of uniforms.

Residencies offered with the chairman or chief of each service are as follows:

Anesthesiology	(Chm.) David Watkins, M.D., Ph.D.
Family Medicine	(Chf.) Samuel W. Warburton, Jr., M.D.
Internal Medicine	(Chm.) Joseph Greenfield, M.D.
Dermatology	(Chf.) Sheldon Pinnell, M.D.
Neurology	(Chf.) Allen Roses, M.D.
Obstetrics and Gynecology	(Chm.) Charles Hammond, M.D.
Ophthalmology	(Chm.) Robert Machemer, M.D.
Pathology	(Chm.) Robert Jennings, M.D.
Pediatrics	(Chm.) Samuel L. Katz, M.D.
Pediatric Allergy	(Chf.) Rebecca Buckley, M.D.
Pediatric Cardiology	(Chf.) Page Anderson, M.D.
Psychiatry	(Chm.) Bernard Carroll, B.M., B.S., Ph.D.
Radiology	(Chm.) Charles Putnam, M.D.
Imaging	(Chf.) Carl Ravin, M.D.
Nuclear Medicine	(Chf.) R. Edward Coleman, M.D.
Radiology Oncology	(Chf.) Leonard Prosnitz, M.D.
Surgery	(Chm.) David C. Sabiston, Jr., M.D.
General Surgery	(Chf.) William G. Shingleton, M.D.
Neurosurgery	(Chf.) Robert H. Wilkins, M.D.
Oral Surgery	(Chf.) Nicholas G. Georgiade, D.D.S., M.D.
Orthopaedic Surgery	(Chf.) James R. Urbaniak, M.D.
Otolaryngology	(Chf.) William R. Hudson, M.D.
Plastic Surgery	(Chf.) Donald J. Serafin, M.D.
Thoracic Surgery	(Chf.) David C. Sabiston, Jr., M.D.
Urologic Surgery	(Chf.) David F. Paulson, M.D.

Duke University Medical Center is a participating member of the National Resident Matching Program, One American Plaza, Suite 807, Evanston, Illinois 60201, and all applicants for first-year post-medical school appointments must register with this program.

Both men and women graduates of any L.C.M.E.-accredited medical school are eligible for appointment and all applicants will be considered without regard to race, color, religion, sex, or national origin.

Requests for application forms and information about straight residencies should be addressed to the Chairman of the service under which training is desired. A transcript of the medical school record is required, and must either accompany the application or be furnished by the Dean of the Medical School.

Graduates of medical schools outside the United States and Canada must hold a valid standard or interim certificate of the Educational Commission for Foreign Medical Graduates (ECFMG), 3624 Market Street, Philadelphia, Pennsylvania 19104, to be considered for appointment to residencies. Physicians who are not U.S. citizens or permanent residents must have passed the Foreign Medical Graduates Exam in the Medical Sciences (FMGEMS) or the Visa Qualifying Exam (VQE) to be eligible for a visa. An application which does not include a copy of a valid ECFMG certificate and evidence of passage of the FMGEMS or VQE will be considered incomplete and may

be discarded without further notice to the applicant. First-year positions are rarely available for foreign medical graduates. For further information contact Catheryn Cotten, Office of International Affairs, Box 3882, Duke University Medical Center, Durham, North Carolina 27710.

A North Carolina license is required for all appointees.

Reasonable requests for reduced scheduling will be considered. Inquiries should be directed to the training program directors of approved residencies or to the Office of House Staff Affairs. For further information, please contact Mary C. Fendt, Administrative Assistant, House Staff Office, Box 3951, Duke Medical Center, Durham, North Carolina 27710.

The Durham Veterans Administration Medical Center adjoins the Duke University Campus and is operated under the supervision of the Vice-President's Committee of the Duke University Medical Center. The full-time professional staff of the V.A. Medical Center are all faculty members of the School of Medicine. All training programs are integrated with corresponding programs at the Duke University Medical Center, including rotation of house officers at each hospital.

All residents and clinical fellows are required to be licensed by the State of North Carolina. This may be accomplished by (1) a residency training license that covers only training by Duke and is not convertible to a full North Carolina license or (2) a full North Carolina license that is a complete medical license obtained either by State Boards (North Carolina Boards can only be taken upon completion of internship) or National Boards and is fully reciprocal with other states for full licenses. Duke Medical Center cannot make applications for house staff. Since house staff members must have the license before beginning duties, arrangements for the license should be made in advance. All incoming house staff *must* contact Bryant Paris, North Carolina State Board of Medical Examiners, 222 North Person Street, Raleigh, North Carolina 27601, for current licensure requirements.

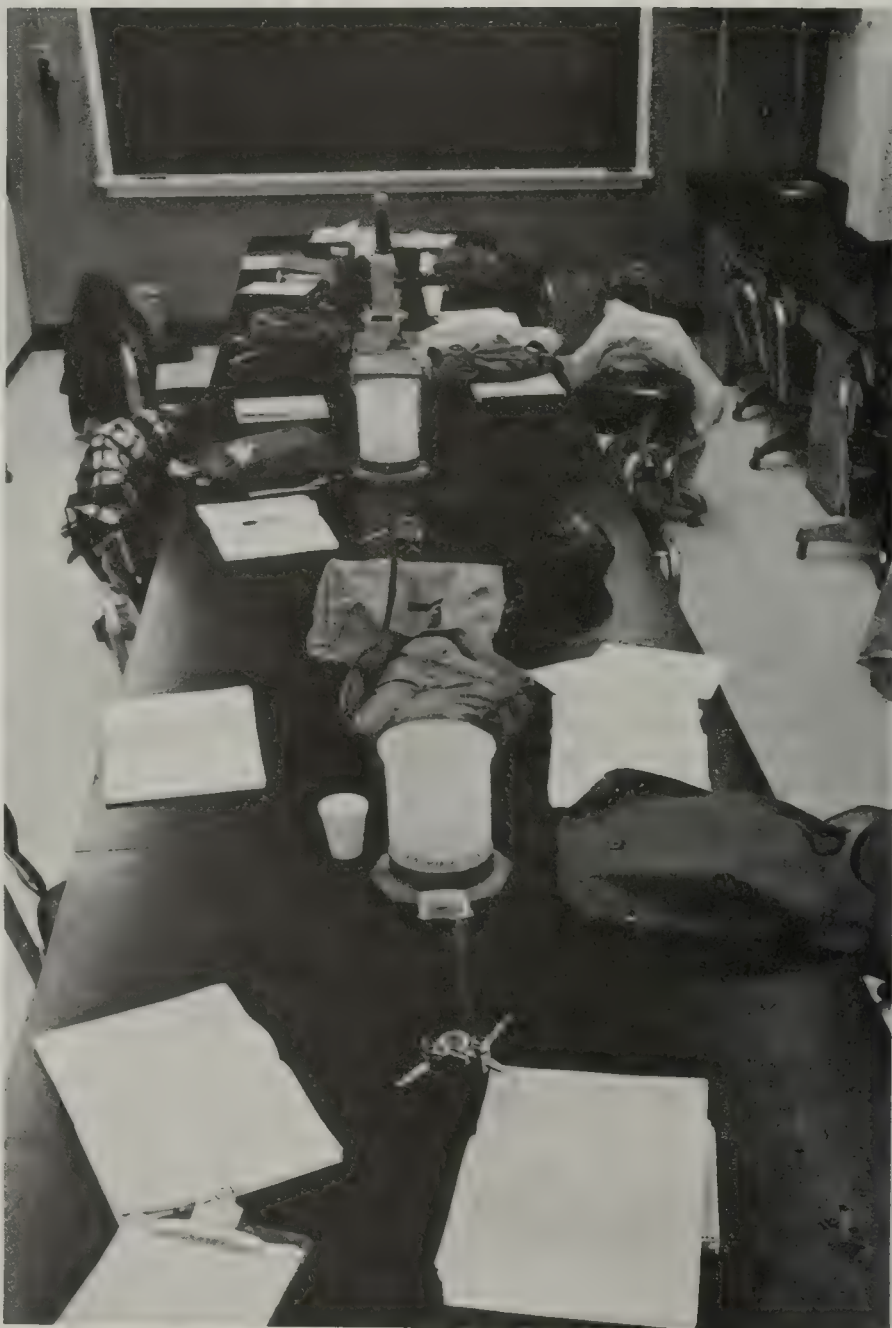
Application forms and information for residencies or fellowships may be obtained by writing the chairman of the appropriate department, Duke University Medical Center, Durham, North Carolina 27710.

Continuing Medical Education. Numerous formal postgraduate courses are given throughout the entire year for physicians in general practice as well as in all specialties. Conferences and tutorial seminars are also available to any physician who desires to attend and participate. Physicians in practice may make arrangements for a period of one day or more for courses tailored to their particular interests. These personal contacts with senior faculty and residents, including patient examinations as well as follow-up care, provide in-house training experience.

The annual one-week course held in Atlantic Beach in mid-July continues to be one of the most well-attended programs in the region.

For additional information, please contact Roy T. Parker, M.D., Director, or Cynthia C. Easterling, M.Ed., Coordinator, Continuing Education, Duke University School of Medicine, Box 3108, Durham, North Carolina 27710, (919) 684-6878.

Student Life



The University

Duke University, located in Durham, North Carolina, has an enrollment of 9,868 students from all fifty states and from many foreign countries. Currently, Trinity College of Arts and Sciences, the Graduate School, and the Schools of Business Administration, Divinity, Engineering, Forestry, Law, Medicine, and Nursing comprise the University.

Durham, with a population of approximately 100,000, is in the Piedmont region of North Carolina, which has easy access to the sea coast and mountains. It is one of the three cities bounding the Research Triangle Park where numerous private research laboratories and governmental agencies are located. Duke University is twenty-five miles from North Carolina State University in Raleigh and eight miles from the University of North Carolina at Chapel Hill.

Conduct of Students

Duke University expects and will require of all its students cooperation in developing and maintaining high standards of scholarship and conduct.

All students are subject to the rules and regulations of the University which are currently in effect, or which, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates the willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations, or for conduct adjudged unsatisfactory or detrimental to the University.

Living Accommodations

Duke University has several residential facilities in which graduate and professional students live: Town House Apartments and modular homes for single students, and Central Campus Apartments for single and married students.

Town House Apartments. Town House Apartments, located about three blocks from the main East-West Campus bus line, is a thirty-two-unit complex which houses single graduate and professional school students. These apartments are more spacious than most apartments found on campus or in Durham. Because of its location away from the academic facilities, students find that these apartments offer a change from normal campus life and activities. They are available for continuous occupancy throughout the calendar year.

Each air-conditioned apartment includes a living room, a master bedroom, a smaller bedroom, a bath and a half, and an all-electric kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months.

Occupants must make arrangements with the local utility companies to pay for electricity, gas, and telephone service. These companies usually require a deposit when initial applications for service are made. Utility companies should be contacted prior to arrival as it usually takes several days to obtain service.

Central Campus Apartments. During 1975, Duke University completed a 500-unit apartment complex. Apartments are available throughout the calendar year for continuous occupancy to single and married students attending graduate and professional schools.

All Central Campus Apartments are completely furnished by the University. An itemization of furnishings is included with the floor plans sent out in the application packet.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephones, which are provided in preinstalled locations in each apartment, are serviced through Duke University's Tel-Com telephone service. Central Campus Apartments residents are responsible for having their phones connected.

Efficiency, two-bedroom, and three-bedroom apartments are rented to single students. Efficiency units are very limited in number and are not generally available to new students. Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic term to the University. This method permits students to share apartments with others of their choice. When this is impractical, the Department of Housing Management strives to place persons with similar interests together.

One bedroom and two bedroom units are provided on a lease basis to married students and monthly rental payments should be made as required by the terms of the lease.

Modular Homes. The University owns six prefabricated modular homes that are located one block from the main East-West Campus bus line. Three of the three-bedroom houses are occupied by single graduate and professional students. The houses, completely furnished, provide more privacy than most apartments and are available to single graduate and professional students for continuous occupancy throughout the calendar year.

In addition to having three bedrooms, each home contains a full bath, an all electric kitchen, a dining area, and a living room. Sliding glass doors in the living room open onto a wooden deck. An outside storage area is provided in addition to spacious closets within the home. Except for the bathroom, kitchen, and dining area, the homes are completely carpeted and paneled.

Residents of the modular homes are responsible for making arrangements with local utility companies for electricity and telephone services.

Application Procedures. When students are informed of their acceptance to the Medical School they will also receive a postcard on which to indicate preference for University housing. This postcard should be returned to the Department of Housing Management. Detailed information on the types of accommodations and application forms will be forwarded to the accepted student. Assignment to all University housing is made on a first-apply, first-assigned basis, and it is not guaranteed.

Off-campus Housing. The Department of Housing Management maintains a listing of rental apartments, rooms and houses provided by property owners or real estate agencies in Durham. These listings are available in the department only; during

the summer an assistant is available to answer questions and aid students in their attempt to obtain housing off campus. Except for assuring that owners sign a statement of nondiscrimination, off-campus property is in no way verified and neither the University nor its agents negotiate between owners and interested parties.

The search for accommodations should begin as soon as possible after acceptance to the Medical School. A visit of two or three days will allow you the opportunity to make use of the off-campus service and to inspect personally the availabilities.

Dining Facilities. The Medical Center cafeteria serves students and employees. Other dining facilities located on campus near the Medical Center provide settings for every style of dining, whether a hamburger or prime rib served to your taste. Visit one of the cafeterias at Trent, East or West Union; or stroll through the beautiful Bryan Center with its Rathskeller and Boyd-Pishko Cafe; or relax in the comfort of the Oak Room. See the section on dining facilities in the chapter, "Financial Information" for more information.

Services Available

Student Personal and Professional Advisory Program. One important objective of Duke University School of Medicine is to promote an informal, cordial student-faculty relationship. All entering students are matched on a voluntary basis to advisers who share mutual interests. These faculty advisers will be available to the students throughout their undergraduate medical education. Advisers are assigned from a group of faculty members who have volunteered to serve in this capacity and who have been recommended by their chairman.

Student Health Service. In recognition of the unique health needs of medical students whose activities bring them into far greater contact with communicable disease than the average university student, a special health program for medical students has been established. Each freshman will submit, prior to entry, the standard Duke History and Physical Examination form to be completed by a physician. Before entry into the first year class, all students must present written proof of current immunization status. A special form will be provided for this purpose. Immunization procedures required *before* matriculation include polio, mumps-measles, rubella, diphtheria-tetanus booster, and IPPD tuberculin test. The IPPD will be repeated in the junior year.

Students receive ambulatory care at the Student Health Clinic during regular office hours.

The main components of the Health Service include the Student Health Clinic in the Marshall I. Pickens Rehabilitation Center, located at the corner of Trent Street and Erwin Road, and the infirmary on the East Campus. For treatment of most illnesses or injuries, students should first contact the Student Health Clinic. Transportation may be made via the campus bus, or emergency transportation can be obtained from the Duke Campus Police or the Durham Ambulance Service.

The facilities of the Student Health Service Clinic are available during both regular and summer sessions to all currently enrolled full-time students attending classes at Duke. The facilities of the University Infirmary are available during the regular sessions only from the opening of the University in the fall until Graduation Day in the spring.

The resources of the Duke University Medical Center are available to all the Duke students and their spouses and children. Charges for any and all services received from the Medical Center are the responsibility of the student as are the charges for services received from physicians and hospitals not associated with Duke University.

For emergency problems when the Student Health Clinic is not open, the emergency room at Duke University Medical Center is available. The financial responsibility for expenses incurred in the emergency room rests with students or their parents.

In addition to the Student Health Service, the University makes available a plan of accident and sickness insurance to cover all full-time students who are enrolled in the University. This plan is designed to complement services normally not accessible to students through the Student Health Service coverage; it covers students both on and off campus, at home, or while traveling between home and school during the interim vacation periods throughout the one-year term of the policy.

The Student Health Program does not provide health care for spouses and dependent children of married students. There are provisions in the insurance plan, however, for coverage of the married student's family. Preexisting conditions of dependent spouse and/or children are not covered.

The Duke Student Accident and Sickness Policy. The Duke Student Accident and Sickness Insurance Policy is available at a reasonable charge. The supplemental coverage provides coverage for hospitalization and major medical expenses. The policy is more fully described in a brochure sent through the bursar's office.

Vacations and Free Quarters. All students should take note that the Student Health Service does not provide care during quarters for which fees and tuition are not being paid.

The supplemental health insurance plan is designed to complement services normally available through the University Student Health Service in order that students may be protected at times when the service does not apply and for accidents and illnesses which it does not cover. This plan provides protection twenty-four hours per day during the full twelve-month term of the policy for each student insured. Students are covered on and off the campus, at home, while traveling between home and school, and during interim vacation periods.

Information concerning the availability of additional health care may be obtained from the Student Health Service. These rules and regulations are those in effect at the time of publication of this bulletin, but are subject to change at a later date.

All full-time and part-time degree candidate students are required to enroll in the Student Accident and Sickness Insurance Policy unless they show evidence by completing the appropriate waiver statement contained on the remittance form of the University invoice indicating that they are covered by other generally comparable insurance. This statement requires that the name of the insurance company and the policy number be indicated as well as the signature of the student or parent. Also, note this requirement may be waived by signing the appropriate space on the University invoice indicating willingness to assume the medical costs of any sickness or accident.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) is located in Suite 214, Old Chemistry Building, on West Campus next to the Medical School. Services are available to all undergraduate, graduate, and professional students enrolled at Duke University. CAPS provides a coordinated and comprehensive range of services including evaluation and counseling regarding personal problems relating to family, social, academic, vocational, and sexual matters; psychological testing encompassing vocational assessment; and psychotherapy for more serious psychological problems. While students' visits with counselors are usually by appointment, a walk-in consultation service is provided two hours each weekday for students with urgent personal concerns.

Each year CAPS offers a series of self-development seminars focusing on personal skills and special interests. These explore such interests as stress-management, assertiveness training, career planning, couple's communication, and graduate women's issues. Interested students may contact CAPS for further information.

The professional staff is composed of clinical social workers, psychiatrists, and clinical and counseling psychologists who are experienced in working with young adults. When a student and a staff member have evaluated the student's concern, then individual sessions, joint sessions with couples, and/or group counseling and psychotherapy may be recommended to help the student resolve the concern. CAPS maintains a policy of *strict confidentiality* about each student's contact with the CAPS staff. Such information can be released, however, upon the student's specific written authorization.

Initial evaluation and brief counseling/psychotherapy, as well as skills development seminars, are covered by payment of the student health fee. There are no additional costs for these services. If appropriate, a referral may be made to other staff members or to a variety of local resources including multidisciplinary mental health professionals in private practice and clinic settings.

Appointments may be made by telephone or at the CAPS office. Office hours are Monday through Friday between 8 A.M. and 5 P.M. If a student's concern needs immediate attention, it should be indicated by the student and every effort will be made for a counselor to talk with the student at the earliest possible time.

Additionally, standardized testing is administered for the University community by CAPS. These include the Graduate Record Examination (GRE), Medical College Admission Test (MCAT), Law School Admission Test (LSAT), and Graduate Management Admission Test (GMAT). CAPS also maintains a library of a wide selection of vocational and educational program resource materials to assist students in choosing a career and/or further training programs in graduate or professional study.

Another important function of CAPS is the availability of the staff to the entire University community for consultation and participation in educational activities regarding student development and general mental health issues. The staff works with other campus personnel including administrators, faculty, the Student Health Service, Religious Life Staff, Residential Advisers, Office of Placement Services Staff, and student groups such as Freshman Advisory Counselors, PISCES, and Project Wild in meeting whatever student needs are identified through such liaisons.

Student and Professional Organizations

Alpha Omega Alpha. Alpha Omega Alpha Honorary Medical Fraternity was organized nationally in 1902 and the Duke Chapter (North Carolina Alpha) was chartered in 1931. The aims of this society are the promotion of scholarship and research in medical schools, the encouragement of high standards of character and conduct among students and graduates, and the recognition of high attainment in medical science, practice, and related fields. Students who have demonstrated leadership and academic promise of future achievement are elected. Membership is limited to no more than one sixth of any class and of these as many as one half may be elected in the junior year. Honorary membership in the fraternity, as well as honorary alumni and faculty membership, may also be conferred upon certain physicians who have distinguished themselves in the various areas of medical teaching, research, and practice.

Davison Society. All medical students are dues-paying members of the Davison Society which is governed by elected officers and class representatives comprising the Davison Council. The Davison Council functions as the official representative body for Duke medical students and as such nominates or elects students to serve on all appropriate Medical Center and University committees including: MedSAC, MEPAC, Admissions, Curriculum, Judiciary, Graduate and Professional Student Council, Library, Human Experimentation, Student Health Advisory Committee and several other committees.

Currently subcommittees of the council are looking at the issues of curriculum evaluation; primary care at the Medical Center and in medical education at Duke; and communication to all students of the opportunities available for study away from the University such as externships and residencies.

Student representatives are appointed by the Davison Council to attend the annual meetings of the American Medical Student Association, North Carolina Medical Society, American Medical Association, Association of American Medical Colleges, the Southern Medical Association, and other meetings of importance to medical students. Students have been sponsored to attend the Congress on Medical Education, the AMA Congress on Medical Ethics, American Women's Medical Association, and the Student National Medical Association annual meetings.

Publications of the Davison Society include a weekly newsletter, *Shifting Dullness*, and a student directory. Socially, the society sponsors beer and pizza dinners with faculty and administrators, class parties, a spring picnic, a fall dance, and the annual spring Medical School Show.

Other medical student groups recognized by, and in part funded by, the Davison Society include the American Medical Student Association, Rural Health Coalition, the American Medical Women's Association, the Student National Medical Association, the Sex Education Committee (which runs an elective course for nursing and medical students, an evening course for undergraduates, and gives courses in the local junior high schools), and the East End Clinic (a free clinic run by medical, nursing, pharmacy, and other students from Duke and the University of North Carolina, Chapel Hill).

The Honor Code is also authorized and administered by the Davison Society.

The Engel Society. The Engel Society, established in 1966 as a memorial to Professor Frank L. Engel, is designed to promote intellectual and social interaction between students and faculty. Membership is limited to six junior students and six senior students who have demonstrated an inquisitive nature, humanitarian interests, and high scholastic ability. Four faculty members are selected annually by members of the society for three year terms. Six dinner meetings with guest speakers are held each year. Other students may be invited to participate.

Duke University Medical Alumni Association. The Duke Medical Alumni Association consists of nearly 6,000 members including all graduates of the Medical School, past and present faculty, and all past and present house officers of Duke Hospital. A magazine is sent to all members three times annually. November reunions are held each year in Durham. Alumni groups meet in several states and meetings are held in conjunction with the meetings of the American Medical Association, the American College of Physicians, the Southern Medical Association, the North Carolina Medical Society, and several departmental specialty society meetings. Several social functions for medical students are sponsored annually, as is a Business of Medicine Series to provide free information on taxes, insurance, wills, and so forth. The Medical Alumni Association also maintains a listing of alumni willing to host students in their local area.

Officers. President: F Maxton Mauney, Jr., M.D., 1959, Asheville, North Carolina; Secretary-Treasurer: Jay M. Arena, M.D., 1932, Durham, North Carolina; R. C. "Bucky" Waters, Assistant Vice-President for Health Affairs-Alumni and Development; Janet Sanfilippo, Director, Medical Alumni Affairs.

Awards and Prizes

Davison Scholarship. The Davison Scholarship award, consisting of \$1,000, is supported by the Davison Club in the memory of Dean Davison to enable a medical student to participate in a clinical science elective outside the United States in an area of primary care. Any student eligible to study away may apply for the award. For

consideration for the scholarship, the elective must be approved by the Study Away Committee.

Thomas Jefferson Award. This award, consisting of \$100, a certificate, and a book recognizes a graduating senior student who has made outstanding contributions to the University or to fields which have not been traditionally confined to science and medicine. The award is given by the Awards Committee to a graduating senior.

The Joseph Eldridge Markee Memorial Award in Anatomy. This award, donated by the friends and family of the late Dr. J. E. Markee, James B. Duke Professor of Anatomy and Chairman of the Department of Anatomy from 1943 to 1966, consists of a certificate, medallion, and cash award of \$200. It is presented by the Department of Anatomy to the most outstanding student in anatomy during the first year in the Medical School.

C. V. Mosby Book Award. Three graduating senior students are selected by the Awards Committee for active participation in service to the students, community, and medical school. The award is a Mosby book of the student's selection.

Trent Prize. An annual award of \$100 is given to a Duke medical student for the best essay on any topic in the history of medicine and allied sciences. Mary Trent Semans established this award in memory of the late Josiah C. Trent to encourage students to undertake independent work in the history of medicine and to utilize the resources of the Trent Collection.

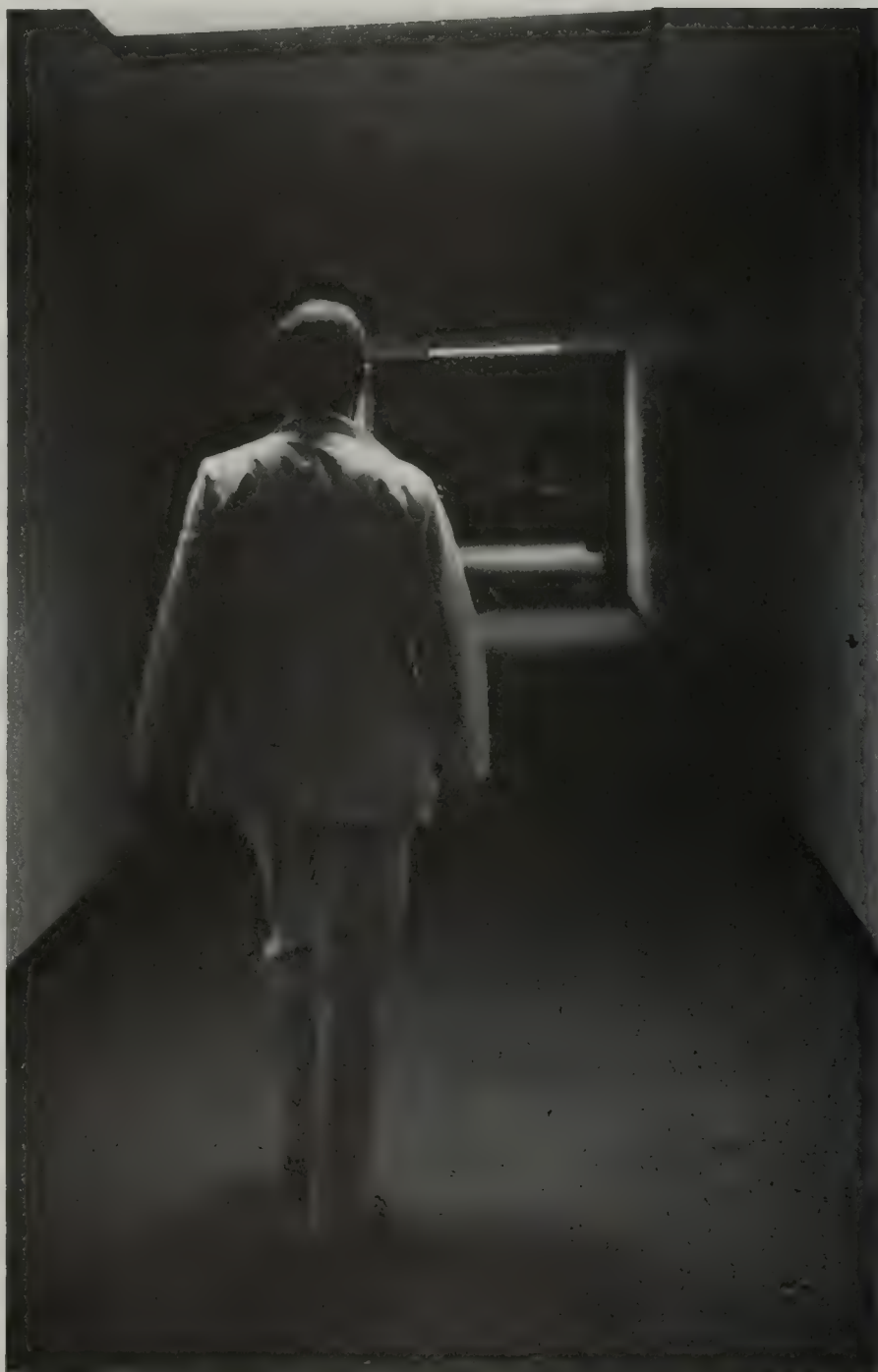
Upjohn Award. The award consists of \$200 cash and a certificate and is presented to a Duke graduating senior for excellence in community health science projects and service to the community.

Sandoz Award. This award is given to a senior student who has done distinguished work in basic science research or clinical research. Students will be nominated for this award by departmental Chairmen with whom their work has been done. The work must have been presented at the AOA symposium and voted upon by the Awards Committee. It consists of a plaque and a check for \$100 and is limited to one student.

Ciba Award. This award is given to a third year student who has contributed to the health care of the community. Students are nominated by the student body and voted upon by them. The award consists of the complete set of medical illustrations and text by Frank Netter.

Other Awards. Throughout the year, Duke Medical School receives notification of awards consisting of books, money, and/or plaques or medals to be awarded to students in a variety of fields at all medical schools on a national competitive basis selected by committees of the sponsoring organizations. These awards are screened by the Assistant Dean for Student Affairs who announces awards which are of interest to the Duke medical students. Since these are national competitions, they vary from year to year.

Admission



Admission Procedures

Good study habits, intelligence, character, and integrity are essential qualifications for admission. Beyond this, premedical students should strive for an education that develops abilities to observe critically, think analytically, and work independently. Though a knowledge of basic scientific principles should be secured, the competence with which premedical students conduct their undergraduate careers is of more importance than the specific subjects which they study.

Application for Admission. The Duke University School of Medicine participates in the American Medical College Application Service (AMCAS). Application materials may be obtained from a premedical adviser or by writing: American Medical College Application Service, Association of American Medical Colleges, Suite 301, 1776 Massachusetts Avenue, N.W., Washington, DC 20036.

Upon receipt of the application materials from AMCAS, a supplemental application and a bulletin of the School of Medicine will be mailed which will serve as notification of receipt of the application from AMCAS. Applications are received by AMCAS any time after June 15 until November 1. Applicants are urged to file their applications as early as possible.

Upon receipt of the supplemental application, two faculty members will determine whether or not to proceed with an interview.

Requirements. Admission to the School of Medicine requires a minimum of ninety hours of approved college credit including one year of college English (consisting primarily of expository English composition), one year of inorganic chemistry, one year of organic chemistry, one year of physics, one year of biology and/or zoology, and one year of calculus. Embryology and physical chemistry are strongly recommended but not required. An introductory course in biochemistry during the senior year would be helpful. All science requirements must be completed not more than seven years prior to entrance.

The Medical College Admission Test, administered by the American College Testing Programs and Services, P.O. Box 414, Iowa City, Iowa 52240, is required of all applicants. This test is given in April and September of each year at numerous colleges throughout the United States. Students should consult their premedical advisers and arrange to take this test in April of the year they plan to submit applications for admission.

Selection

The earliest date of notification of acceptance is 15 October for students entering the following August. Data on each candidate are carefully evaluated by the Committee on Admissions. If the distance is not too great, a personal interview will be conducted at Duke for those students with satisfactory credentials. Other candidates will be referred for personal interviews with regional representatives of the Admissions Committee. Those candidates who demonstrate the most promise for exceptional performance in their future practice of medicine are admitted on the basis of merit and are notified as soon as possible whether or not they have been accepted. In order to ensure enrollment, accepted candidates must return a signed agreement and a \$50 deposit within three weeks after notification. Since admission is offered a considerable period in advance of matriculation, it is provisional upon the successful completion of any incomplete premedical required subjects as well as the continued demonstration of scholarship in college course work.

Transfer

Applicants who have completed the basic sciences in other medical schools will be considered for transfer only as space permits. Such transfer students are required to complete the second and fourth years of the Duke curriculum.

Performance of Part I of the National Board Examination or MSKP is a requirement for transfer applicants. Duke does not sponsor applicants to take the National



Board Examination, although the scores must be received as part of the evaluation procedure.

The policy governing tuition for transfer students is that they will pay the same tuition in their initial year and all subsequent years as the class with which they enter.

Requests for application materials should be sent to the Committee on Admissions, Box 3710, Duke University Medical Center, Durham, North Carolina 27710.

Requests for application materials are accepted after 15 November. 1 March is the deadline date for the receipt of applications. Personal interviews will be arranged for those with satisfactory credentials. Transfers into the freshman or senior year are not permitted.

Advanced Placement

Advanced placement is offered to qualified first-year students on an optional basis for the following first semester courses: anatomy, biochemistry, genetics, and physiology. Students desiring consideration for advanced placement are required to take examinations in applicable subjects during the first week of medical school. Those who are granted and accept advanced placement for a specific course are not required to enroll in that course but will be responsible for arranging mutually satisfactory substitutions with the appropriate department Chairman.

Students who have been awarded Ph.D. degrees in biomedical or preclinical sciences may apply for a three-year program to obtain their M.D. degrees. This program consists of the regular core basic science courses required of all freshman medical students, core clinical rotations during the second year, followed by senior clinical electives.

Reapplication

Students who wish to apply for a second time should write AMCAS requesting new application forms. Supporting documents will be transferred to the new application file. These documents will be kept on file for three years.



Summary

Three years of college work, forty-five dollars (\$45) nonrefundable application fee, fifty dollar (\$50) deposit within three weeks of notification of acceptance, and the Medical College Admission Test are required. The estimated class size in 1985-86 freshman class is 108.

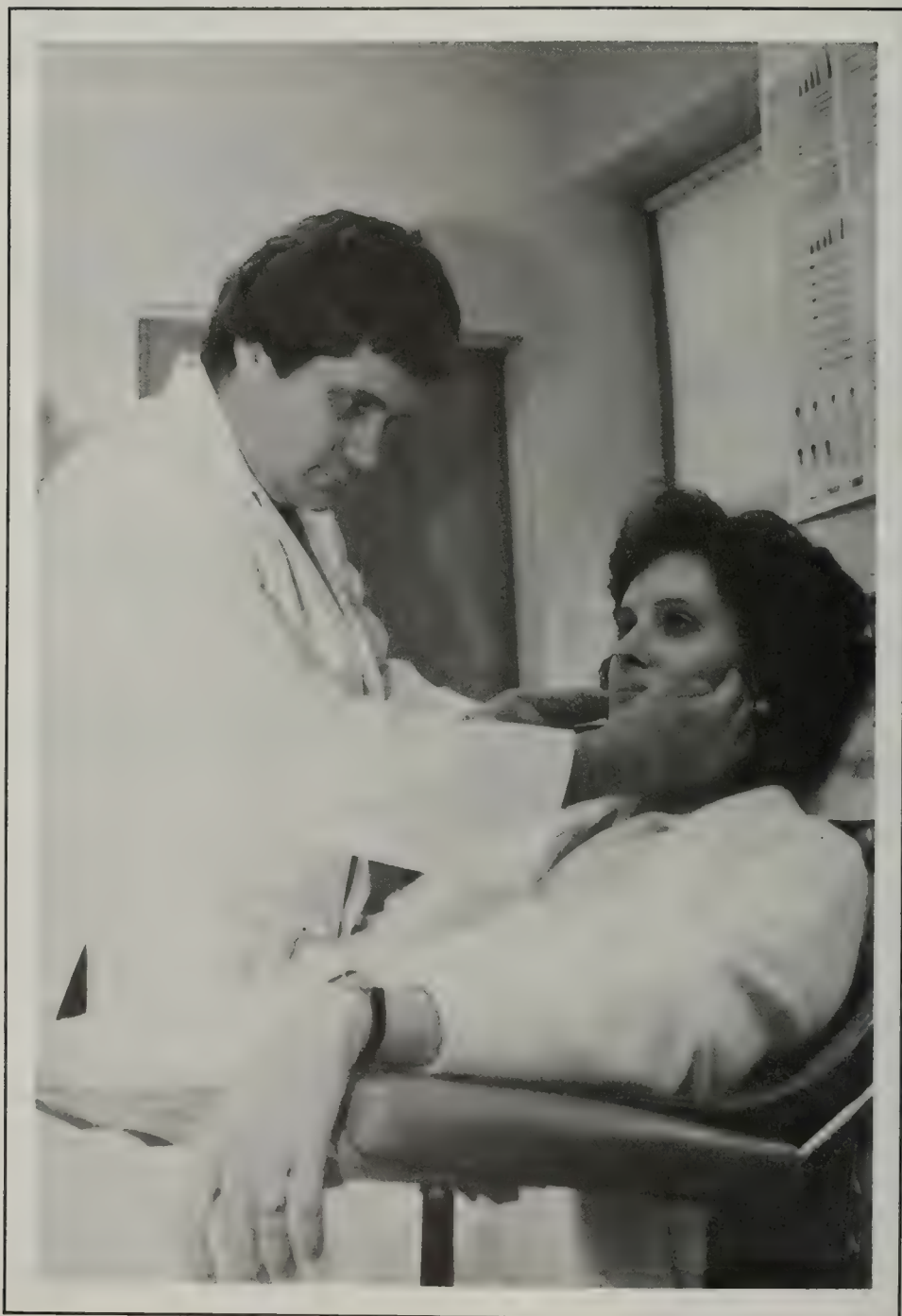
Application requests are accepted from 1 April to 15 October. Applications for admission must be received between 1 June and 1 November 1984. Students will be notified beginning 15 October 1984. Orientation begins 16 August 1985.

Roster of Regional Representatives of Admissions Committee

Alabama:	<i>Birmingham</i> , Ben V. Branscomb; <i>Tuskegee</i> , Alexander W. Boone, Jr.
Alaska:	<i>Anchor Point</i> , Milo H. Fritz; <i>Sitka</i> , J. Paul Lunas
Arizona:	<i>Phoenix</i> , Robert H. Barnes; <i>Scottsdale</i> , Boyd H. Metcalf
Arkansas:	<i>Little Rock</i> , Rosalind Smith Abernathy, E. Clinton Texter, Jr.
Belgium:	<i>Liege</i> , Emile F. LeClercq
California:	<i>Bakersfield</i> , Victor S. Constantine; <i>Berkeley</i> , Bruce Africa; <i>Beverly Hills</i> , Ben Kohn; <i>Burlingame</i> , J. M. Javer, Lester H. Margolis, Andrew Nadell; <i>Carlsbad</i> , Barry B. Campbell; <i>Fairfield</i> , William R. Nesbitt; <i>Fontana</i> , Henry L. Burks; <i>Hayward</i> , William New, Jr.; <i>Irvine</i> , A. Brian Davis; <i>Los Angeles</i> , Walter Lusk, Kenneth P. Rammings, Douglas F. Smiley; <i>Palo Alto</i> , Gustave Freeman, James B. Golden, John B. Simpson; <i>Redlands</i> , Perry Dyke; <i>Riverside</i> , James S. Mayson; <i>San Diego</i> , Donald J. Williams; <i>San Francisco</i> , Philip G. Hoffman, R. Gray Patton; <i>Santa Barbara</i> , John A. Baumann; <i>Woodland Hills</i> , Andrew A. Bonin
Canada:	<i>Montreal</i> , J. E. Gibbons; <i>Ontario</i> , John B. Armstrong
Colorado:	<i>Aurora</i> , Frederick V. Coville; <i>Colorado Springs</i> , John P. Tindall; <i>Denver</i> , Michael J. Jobin, Fred W. Schoonmaker, Charles Scoggin; <i>Englewood</i> , Bertram Goldberg
Connecticut:	<i>Greenwich</i> , Milton F. Campbell; <i>Hartford</i> , William H. Glass; <i>Mystic</i> , Henry B. Freye; <i>New Haven</i> , David J. Goodkind, Ned M. Shutkin
England:	<i>Oxford</i> , Sanders Williams
Florida:	<i>Jacksonville</i> , J. David Cahill; <i>Miami</i> , Stanley J. Cannon, James J. Hutson; <i>St. Petersburg</i> , David S. Hubbell; <i>South Miami</i> , Leonard A. Kalman; <i>Tampa</i> , Richard G. Connar, Americo A. Gonzalvo
Georgia:	<i>Albany</i> , Havner H. Parish, Jr.; <i>Atlanta</i> , Crawford F. Barnett, Jr.
Hawaii:	<i>Honolulu</i> , James G. Harrison; <i>Kailua</i> , Stanley Karansky
Idaho:	<i>Idaho Falls</i> , Reid H. Anderson
Illinois:	<i>Barrington</i> , George Pepper; <i>Chicago</i> , John H. Buehler, George H. Gardner, Daniel J. Pachman, Joe L. Simpson, John D. Utley, Milton Weinberg, Jr.; <i>Des Plaines</i> , Earl N. Solon; <i>Evanston</i> , Donald R. Mundie; <i>Geneva</i> , Charles A. Hanson; <i>Monmouth</i> , Kenneth E. Ambrose
Indiana:	<i>Indianapolis</i> , Norman H. Bell, Mark O. Farber, C. Conrad Johnston, Jr.
Kansas:	<i>Emporia</i> , Gould C. Garcia; <i>Lenexa</i> , David L. Smith; <i>Salina</i> , Roy B. Coffey
Kentucky:	<i>Louisville</i> , Billy Franklin Andrews, George Uhde
Louisiana:	<i>New Orleans</i> , Nancy Haslett, James A. Knight, Richard M. Paddison
Maine:	<i>Portland</i> , E. Charles Kunkle
Maryland:	<i>Baltimore</i> , C. Edward Leach, John Modlin; <i>Mt. Rainier</i> , Linda D. Green; <i>Olney</i> , Joseph Buffington; <i>Potomac</i> , Mona M. Shangold; <i>Towson</i> , William C. Battle
Massachusetts:	<i>Boston</i> , R. Wayne Alexander, G. P. Beardsley, Ann W. Crosson, Richard J. Kopelman, Britain Nicholson, Ellison C. Pierce, Jr, Stephen Sohn; <i>Brookline</i> , Bernard Levy; <i>Cambridge</i> , Paul N. Chervin; <i>Hyannis</i> , Linda A. Bishop; <i>Springfield</i> , George A. Sotirion; <i>Stoughton</i> , Philip A. Hourigan, Jr.; <i>Worcester</i> , Katherine S. Upchurch
Michigan:	<i>Ann Arbor</i> , George E. Bacon, Donald L. Rucknagel, Joann A. P. Wilson; <i>East Lansing</i> , Stephen E. Alpert, William W. Blackburn II; <i>Grosse Pointe</i> , John M. Lesesne
Minnesota:	<i>Fairmont</i> , Lawrence T. Donovan; <i>Minneapolis</i> , Martin M. Oken, Richard L. Reece; <i>Rochester</i> , William Hazel, William M. O'Fallon; <i>St. Paul</i> , John J. Fath
Missouri:	<i>Bridgeton</i> , Thomas J. Banton, Jr.; <i>Creve Couer</i> , Roman L. Patrick; <i>Kansas City</i> , Gerry Woods; <i>Springfield</i> , Norman C. Shealy; <i>St. Louis</i> , James L. Cox, W. Edwin Dodson, Thomas B. Ferguson, James R. Gavin III, Martin A. Morse
Nebraska:	<i>Omaha</i> , Helen Starke
New Hampshire:	<i>Exeter</i> , Eric D. Lister; <i>Grantham</i> , William T. Davison; <i>Hanover</i> , J. Vanderlinde; <i>Lyme Center</i> , George Margolis

New Jersey:	<i>Livingston</i> , Stephen J. Victor; <i>Moorestown</i> , Michael S. Entmacher; <i>Morristown</i> , Philip K. Keats; <i>New Brunswick</i> , William E. McGough, Bernard A. Rineberg; <i>Paterson</i> , Linda F. Rankin; <i>Pompton Plains</i> , Charles W. Ross; <i>Summit</i> , Wayne S. Barber; <i>Watchung</i> , R. Christopher Stucky; <i>Woodcliff Lake</i> , Steven P. Honickman
New Mexico:	<i>Taos</i> , Thomas E. Austin
New York:	<i>Endicott</i> , Vincent Giordano; <i>Great Neck</i> , Stephen M. Lazarus; <i>Ithaca</i> , John G. Maines; <i>New York</i> , Joan S. Adams, Michael Brownlee, Carl H. Fromer, David S. Goldman, Eddie L. Hoover, Bruce Horten, Lenard E. Jacobson, Roy B. Jones, Seymour R. Kaplan, Michael J. Lepore, Phyllis C. Leppert, Leonard H. Schuyler, Robert A. Shimm, David N. Silvers, Nathan St. Amand, Melvin L. Thrash; <i>Pittsford</i> , Rufus S. Bynum; <i>Rochester</i> , David N. Broadbent; <i>Syracuse</i> , Herbert Lourie, L. Stewart Massad, James E. Sheehy; <i>White Plains</i> , Harvey J. Cohen
North Dakota:	<i>Bismarck</i> , Robert B. Tudor
Ohio:	<i>Canton</i> , John A. Nadas; <i>Cincinnati</i> , Murray B. Sheldon, Jr.; <i>Cleveland</i> , Robert B. Kubek; <i>Columbus</i> , David S. Forth, Lucy R. Freedy, George W. Paulson, James V. Warren; <i>Elyria</i> , William L. Hassler; <i>Toledo</i> , George F. Alter; Kenneth Gould, Jr.
Oklahoma:	<i>Muskogee</i> , Robert H. Gibbs
Oregon:	<i>Eugene</i> , Paul W. Jones; <i>Portland</i> , Marcia Freed, Joseph F. Paquet; Martin S. Schwartz
Pennsylvania:	<i>Bryn Mawr</i> , John V. Blady; <i>Camp Hill</i> , Alfred J. Sherman; <i>Doylestown</i> , Zachary A. Simpson; <i>Dunmore</i> , Louis C. Waller; <i>Harrisburg</i> , Earl S. Moyer; <i>Johnstown</i> , W. Frederick Mayer; <i>Lancaster</i> , Richard D. Gentzler; <i>Philadelphia</i> , Max W. Fischbach, Mary Ann Forcica, John J. Furth, David M. Goodner, James R. Harp, Richard I. Katz, Sheila M. Katz, Mildred H. LaFontaine, Dianne M. Quinn, Graham E. Quinn, Alfred M. Sellers; <i>Pittsburgh</i> , Richard L. Green, Jack D. Myers; <i>Wynnewood</i> , Frank Kern
Puerto Rico:	<i>Santurce</i> , Rafael Hernandez-Salanda
Rhode Island:	<i>Lincoln</i> , Henry G. Magendantz; <i>Providence</i> , Benjamin T. Jackson, Richard P. Sexton
South Carolina:	<i>Charleston</i> , Edward Frost Parker; <i>Columbia</i> , Collin F. Baker, Ben N. Miller, James M. Timmons; <i>Greenville</i> , Raymond C. Ramage
South Dakota:	<i>Sioux Falls</i> , Charles Beauchamp
Tennessee:	<i>Chattanooga</i> , Richard Van Fletcher; <i>Knoxville</i> , Alan Solomon; <i>Memphis</i> , Peter D. Jones; <i>Nashville</i> , Walter G. Gobbel, Jr., Alexander C. McLeod, Greer Ricketson
Texas:	<i>Amarillo</i> , Gayle H. Bickers; <i>Austin</i> , Frank A. Morris, Jr.; <i>Dallas</i> , Reuben H. Adams, W. Crockett Chears, Jr., William Shapiro; <i>Houston</i> , Elizabeth B. Powell, Peter T. Scardino, H. Grant Taylor; <i>Midland</i> , Dorothy B. Wyvell
Utah:	<i>Salt Lake City</i> , N. Branson Call, Andrew Deiss, William A. Gay, Jr.
Vermont:	<i>Burlington</i> , Edward S. Horton
Virginia:	<i>Richmond</i> , R. Lewis Wright; <i>Virginia Beach</i> , Ruth Capp; <i>Waynesboro</i> , Thomas L. Gorsuch
Washington:	<i>Bellevue</i> , David T. Pitkethly; <i>Bothell</i> , Ronald C. Reed; <i>Longview</i> , Clifford J. Schostal; <i>Renton</i> , Wallace H. J. Chang; <i>Seattle</i> , Gregory J. Raugi; <i>Spokane</i> , Charles L. Dorsey
West Virginia:	<i>Wheeling</i> , David P. Hill
Wisconsin:	<i>Milwaukee</i> , Jack L. Teasley
Wyoming:	<i>Sheridan</i> , James L. Scott; <i>Teton Village</i> , John A. Feagin

Financial Information



Fees and Expenses

Tuition. The following table represents an estimate of a student's necessary expenses in the School of Medicine. The total of these figures suggests a basic minimum budget of approximately \$16,000. These are estimated figures only and are based on a survey of enrolled students. Tuition and fees are subject to change without notice. Allowances for recreation, travel, clothing, and other miscellaneous items must be added to this estimate with allowances for individual needs and tastes.

Tuition:	First year \$10,500; years 2,3,4 \$9,800 each.
Accident and Sickness Insurance (subject to change)	173.00
Laboratory Fee (includes microscope rental, first year only)*	175.00
Annual Cost of Books: first year	512.00
Annual Cost of Books: second year	340.00
Annual Cost of Books: third and fourth year	171.00
Lodging	2,450.00
Board (University Dining Halls): first and second year	2,300.00
Board (University Dining Halls): third and fourth year	1,800.00
Student Health Service†	237.50
Student Government (Davison Society)†	25.00
Motor Vehicle Registration	30.00

*Sphygmomanometer, ophthalmoscope, otoscope, and other equipment required of each student must conform to rigid standards.

†Mandatory fee. For details, please refer to Student Health Service.

Tuition and fees are payable on a term basis and all students are required to pay full tuition for four years as a requirement for graduation. For the freshman year one-half of the annual tuition and fees is billed in July and the other one-half in December. Students who must repeat 60 percent or more of the required first year courses will pay full tuition while prorated tuition will be paid by those repeating less than 60 percent of those courses. Second year students are billed at the rate of one-sixth of the annual tuition and fees for the Introduction to Clinical Medicine and each of the five required clinical rotations. Juniors and seniors are billed in accordance with the number of elective credits for which they are registered. The cost per credit equals the annual tuition divided by the number of credits required per year.

Payment of Accounts for Fall and Spring. Monthly invoices for tuition, fees, and other charges will be sent by the Bursar's office and are payable by the invoice due date. As a part of the agreement of admission to Duke University a student is required

to pay all invoices as presented. No deferred payment plans are available. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. Nonregistered students will be required to make payment at the time of registration.

Late Payment Charge. If the "Total Amount Due" on an invoice is not received by its due date, the next invoice will reflect a penalty charge of 1¼ percent per month assessed on the past due balance regardless of the number of days past due. The "Past Due Balance" is defined as the previous balance less any payments and credits received on or before the due date and also any student loan memo credits related to the previous balance which appear on the invoice. The amount of the 1¼ percent penalty charge will be the same regardless of the number of days payment is received after the due date.

Restrictions. An individual will be in default of this agreement if the total amount due on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

No credit will be given for any term in which the tuition has not been paid, whether the work has been at Duke or elsewhere. It is not advisable for students to attempt outside work to defray their expenses during the academic year. Spouses of medical students desiring employment may secure information from the Duke University Personnel Office.

Fall and Spring Refunds. Tuition and fees refunds are governed by the following policy:

1. In the event of death a full tuition and fees refund will be granted.
2. In all other cases of withdrawal, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:
 - a. withdrawal before the beginning of classes—full refund;
 - b. withdrawal during the first or second week—80 percent;
 - c. withdrawal during the third through fifth week—60 percent;
 - d. withdrawal during the sixth week—20 percent;
 - e. withdrawal after the six week—no refund;
 - f. tuition charges paid from grants or loans will be restored to those funds on the same prorata basis and will not be refunded or carried forward.
3. In the case of changing category from full-time to part-time, dropping special fee courses (music, art, golf, etc.), or dropping audit courses, a full refund will be granted during the drop/add period. Subsequent to the drop/add period changes of category will not be allowed. Students may, however, withdraw from courses after the drop/add period with no refund or add new courses if the proper tuition is paid.

Transcripts. Requests for transcripts of academic records should be directed to the Office of the Medical Center Registrar. A minimum fee of one dollar, payable in advance, is charged for each copy.

Living Accommodations

Housing Costs. For the 1984-85 academic year, rental rates for the first-year medical student were \$2,162 for the Town House apartments and \$1,903 for the Modular Homes. Utility charges are not included in these rates. Rental rates in Central Campus

Apartments ranged from \$2,172 to \$3,354 for single first-year medical students. Utility charges are included in the Central Campus Apartment rates. These rates are per person per academic year. Rental rates for married students in the Central Campus Apartments ranged from \$363 to \$498 per month. Utility charges are included in these rates.

Rental rates are expected to increase for the 1985-86 academic year. A deposit is required with all applications. The deposit will not be refunded if cancellation is received after an assignment is made.

Refunds of rent will be calculated in accordance with the procedures published by the Department of Housing Management.

Dining Facilities. Duke University Food Services provides well-balanced, nutritious meals for students in a number of food plans. There are six board plan options available to students. Meal plans range in price from \$396 to \$1,960. Whether relaxing in the restaurant setting of the Oak Room or watching wide screen TV while enjoying a deli sandwich in the Down Under on East Campus, quality and service are foremost.

Motor Vehicle Registration

Each motor vehicle operated on Duke University campuses by students enrolled in the School of Medicine must be registered at the Medical Center Traffic Office, PRT Level, Parking Deck II, within five days after operation on the campus begins, and thereafter must display the proper registration decal.

All students must pay an annual fee of \$30 for each four-wheeled motor vehicle and \$15 for each motorbike or motor scooter registered. Bicycles are registered free of charge at the Public Safety Department, 2010 Campus Drive.

To register a vehicle, the student must present a valid state registration for each vehicle registered and a valid state operator's license.

Parking, traffic, and safety regulations will be given each student at the time of registration of the vehicle(s). Students are expected to abide by these regulations.

Merit Scholarships for Medical Students

The School of Medicine offers the following endowed scholarships, ranging from \$1,500 to full four-year tuition, based solely on academic excellence:

Barham Endowed Merit Scholarship, established November, 1984, by gift from Mr. and Mrs. Joseph Barham, Oak Ridge, Louisiana.

Edward H. Benenson Merit Scholarship, established October, 1984, by gift from Mr. Edward H. Benenson, New York.

Family Dollar Scholarship, established November, 1984 by gift from Mr. Leon Levine, Chairman of the Board, Family Dollar Stores, Inc., Charlotte, North Carolina.

Dr. William Redin Kirk Memorial Trust for North Carolinians, established March, 1984, by bequest of Mr. Frederick H. Pierce, Owensboro, Kentucky.

Dr. Kenneth L. Pickrell Scholarship, established February, 1984, by gift from the Department of Surgery, Duke University Medical Center.

School of Medicine Merit Scholarship Fund, established 1984 by gifts from medical alumni, students, and American Medical Association-Education and Research Foundation.

The Merit Scholarship Selection Committee makes final selections from nominees chosen by the Medical School Admissions Office. Candidates may be notified as early as January or February of final selection and alternate status. Annual renewal is contingent upon satisfactory academic progress.

Financial need is not a criteria for selection, however, applicants who feel their financial need is greater than the merit award may apply for financial aid.

The Dean's Partial-Tuition Scholarships. Dean's Partial-Tuition Scholarships for two awards in the amount of \$4,500 each are given to academically excellent/financially needy freshmen minority students each year. Preference is given to residents of North Carolina. Selection is made by the Dean based on recommendations from the Medical School Admissions Office. Annual renewal is contingent upon satisfactory academic progress.

Research Scholarships for Medical Students

The following research scholarships are available to enrolled students for credit during the elective portion of the third/fourth year curriculum. Final selection is made by the Student Research Scholarship Selection Committee.

The *Eugene A. Stead Scholarship* was established by the Department of Medicine in honor of its former Chairman to develop young clinical investigators in the basic sciences. The three recipients each year must complete a twelve-months research experience under the preceptorship of either a member of the Department of Medicine who holds a secondary basic science appointment or a member of a basic science



department. The recipient is designated a Stead Scholar and there is an annual seminar at which each scholar presents his or her work. Each award is in the amount of \$8,000.

The *Stanley Sarnoff Student Research Fellowship* was established by Stanley J. Sarnoff, M.D. to develop young cardiovascular investigators. Dr. Sarnoff was Director of Cardiovascular Research at the National Institutes of Health for many years. The recipient must complete a twelve-months research experience in a cardiovascular laboratory away from the parent medical school. Duke is one of the schools eligible to select one student per year. The recipient is designated a Sarnoff Fellow and there is an annual meeting in Bethesda, Maryland at which each of the ten fellows present his or her work. The amount of each award is \$11,000 plus \$1,000 for travel.

Four *American Heart Association Student Research Fellowship* have been awarded to Duke University School of Medicine to develop young cardiovascular investigators. Recipients must complete a twelve-months research experience which relates to the cardiovascular system. Recipients are designated American Heart Fellows and will meet with those from the other participating schools at the Annual American Heart Association Meeting. Each award is \$8,000.

Sickle Cell Disease Scholarships are funded by The National Foundation for Sickle Cell Disease, Inc. which awards money to the Duke Comprehensive Sickle Cell Center for research each year. The money has been designated for scholarships to students and recent graduates for support of research projects in sickle cell disease. Preference is given to black applicants for awards up to \$5,000.

The *Robert and Virginia McDaniel Fellowship*, established by Robert and Virginia McDaniel, is for medical students who have demonstrated competency in research involving either the cardiovascular system or exercise physiology for the purpose of stimulating involvement in the general area of preventive medicine, health maintenance, and rehabilitation. One scholarship is awarded annually to a fourth year student who has completed at least twelve month's research in either the areas of cardiovascular system or exercise physiology. The recipient must complete at least six weeks of activity with the DUPAC program during or immediately following the fourth year. One \$2,500 fellowship is awarded annually.

Financial Aid

The Duke University School of Medicine makes financial assistance available to accepted students who, due to economic circumstances, could not otherwise attend the University. The school recognizes, however, the responsibility of the individual and the family to provide funds to achieve the objective of a medical education. Thus, the school does not consider that parents have discharged the full financial obligation for the continuing education of their sons or daughters upon the latter's completion of the undergraduate degree.

Financial assistance is available in a combined form of scholarships and loans, and all awards are made on the basis of demonstrated need; however, the School of Medicine can no longer guarantee that funds will be available for every student who documents financial need.

Financial Assistance to Incoming Freshmen. When the medical school applicant receives a letter of acceptance into Duke University School of Medicine, a financial aid application is included if the student has indicated an interest in assistance on the application for admission. The economic circumstances of the applicant have no bearing on whether the applicant is accepted into the Medical School.

The student requesting financial aid is expected to work during the summer preceding entrance into medical school and to save part of these earnings to defray a portion of the first-year expenses.



The student's need must be established before an award can be made. The Office of Financial Aid, therefore, requires the Duke University application for financial aid and computation from the GAPSFAS form. Copies of federal income tax returns and a financial aid transcript are required as part of the financial aid application.

The present financial aid package, which is subject to change, is based on a \$5,000 federal (or state) insured student loan. Financial need in excess of \$5,000 comes from one-half school gift and one-half from school loan.

Financial Assistance to Upperclassmen. Annual reapplication is required of all scholarship and loan recipients. Upperclassmen seeking financial assistance for the first time should consult with the Coordinator of Financial Aid.

Endowed Funds.

Charles W. Banner Loan Fund, established in 1953 by a gift from Mrs. Edward B. Benjamin.

Germain Bernard Scholarship, established in 1959 by the B. C. Remedy Company.

Thomas C. Bost Scholarship, established in 1965 by a gift from Dr. Thomas C. Bost, supplemented by subsequent gifts.

Elizabeth Burgess Bressler Memorial Scholarship Fund, established in 1983 by her children: Garrett S. Bressler, M.D.; Robert B. Bressler, M.D.; Barbara B. Marques; Peter B. Bressler, M.D.

James L. Clark Memorial Scholarship, established in 1965 by a gift from Mr. and Mrs. Marvin D. Clark and supplemented by gifts from other donors.

C. T. Council Scholarship, established in 1959 by the B. C. Remedy Company.

John H. Dorminy Scholarship, established in 1980 by gift from John H. Dorminy, Jr.

Herbert T. Dukes, M.D. Memorial Loan Fund, established in 1983 by his classmates and friends.

Eagles-Andrews Memorial Scholarship, established in 1982 by a gift from Dr. and Mrs. William M. Eagles.

William F. Franck Memorial Scholarship, established in 1958 by gift from William F. Franck, Jr. '39, and supplemented by additional gifts.

Joseph W. Greer Scholarship, established in 1980 by gift from Mr. and Mrs. Joseph H. Greer.

Warren W. Hobbie Fund, established in 1980 by trustees of the Warren W. Hobbie Charitable Trust.

George Lee Hundley and Rebecca Barnhill Hundley Fund, established in 1980 by gift from George Lee and Rebecca Barnhill Hundley.

H. B. and Adelaide F. Ingle Medical Scholarship, established in 1976 by gift from Mr. and Mrs. Harry B. Ingle.

B. Everett Jordan Scholarship, established in 1974 by the late Senator B. Everett Jordan and his widow, Katherine Jordan.

Thomas D. Kinney, M.D. Memorial Scholarship, established in 1980 by gifts from his widow, Dr. Eleanor R. Kinney, and their children: Thomas R. Kinney, M.D.; Eleanor D. Kinney; J.D., Hannah C. Kinney, M.D.; and Janet S. Kinney, M.D.

Dr. John Haden Lane Memorial Scholarship, established in 1968 by gift from Edward H. Lane Foundation.

E. C. Langston Medical Scholarship, established in 1979 by bequest of Mrs. Denzil L. Mosteller.

Paul E. Leviton Medical Scholarship, established in 1981 from the estate of Paul E. Leviton.

James Cecil McGehee Memorial Medical Scholarship, established in 1975 by gift from C. G. McGehee, Jr.

Medical Alumni Scholarship, established in 1974 by Duke Medical Alumni.
 Medical Class of 1950, established in 1980 by gifts from graduates of 1950.
 Medical Class of 1981 and AESCULAPIAN/80 Staff, established in 1980.
 Medical School Faculty Wives Scholarship, established in 1968 by a gift from the Medical School faculty wives whose source of funds is proceeds from the Nearly New Shoppe.
 John F. Ott Endowment Fund, established in 1984 by bequest of John F. Ott, M.D., 1943.
 Physical Medicine Scholarship, established in 1963 by gift from Central Carolina Convalescent Hospital, Inc., Greensboro, North Carolina.
 Radiological Science Medical Student Loan Fund, established in 1980 by the Department of Radiology.
 Senior Class Gift, established by graduates of classes of 1977 and 1978.
 Melvin D. and Judith N. Small Medical School Scholarship Fund was established in 1976 by gift from Dr. Melvin D. and Mrs. Judith N. Small.
 Sigmund Sternberger Endowment Fund, established in 1978 by gift from the Sigmund Sternberger Foundation, Inc., Greensboro, North Carolina.
 William E. Stevens, Jr. Scholarship, established in 1983 by the Broyhill Foundation, Lenoir, North Carolina.
 B. W. Stiles Scholarship, established in 1981 by gift from the Mary Duke Biddle Foundation.
 Francis and Elizabeth Swett Scholarship, established in 1966 by gift from the late Dr. and Mrs. Swett.
 Dr. Hillory M. Wilder Memorial Scholarship, established in 1962 by bequest from Celeste Wilder Blake and Kenneth M. Blake.
 Sue Eggleston Woodward Memorial Scholarship, established in 1966 by gifts from parents, relatives, and friends.
 Vivian Zirkle Memorial Scholarship, established in 1981 by gift from Drs. Lewis and Sara Zirkle.

Other Medical School Scholarships. Mary Duke Biddle Scholarships, Dr. E. Eugene Owen Scholarship, Duke University School of Medicine Scholarships, State of North Carolina (tuition remission up to \$2,000), and Slane Family Scholarship.

Federal Scholarships. Armed Forces (Army, Navy, and Air Force) Scholarship programs are available for accepted or enrolled students. The recipient receives full tuition, fees, and living allowance in return for a commitment of service as a physician for each year of funding. The special application is made directly to the program in which the student is interested.

First-Year Scholarships for Students of Exceptional Financial Need. This federally funded program pays tuition, fees, and living expense. The student must have zero family resources as measured by a nationally recognized needs analysis. Recipients are selected by the school using federal criteria. For 1984-85 there were two scholarships.

North Carolina Board of Governors Medical Scholarships (BGMS). Board of Governors Medical Scholarships (BGMS) are awarded annually to seventeen first-year medical school candidates who have been accepted for admission at one of the four medical schools in North Carolina. BGMS recipients are selected from among candidates of all races who are financially disadvantaged state residents and who have expressed an interest in practicing medicine in the State of North Carolina. The awards provide a yearly stipend of \$4,000 plus tuition and mandatory fees and may be renewed for four years. Information about the scholarship may be obtained from the financial aid office.

Loans

University loans are available under the specific restrictions of the loan funds and are awarded on the basis of financial need. Some of them are: W. K. Kellogg Foundation Loan Fund, Seaborn L. Hardman Loan Fund, Medical Freshman Tuition Loan, Scott Loan Fund, Charles W. Banner Loan Fund, Robert Wood Johnson Foundation Student Aid Program, National Direct Student Loans, and U.S. Health Professions loans.

The Francis and Elizabeth Swett Loan Fund is an emergency loan available in small amounts to any medical student on a no-interest basis for a short period of time.

Federally Insured Student Loans are available to full-time financially needy students at Duke University (an approved lender) if the student is unable to locate a home-town lender.

Loans from Outside the University

North Carolina Student Loan Program for Health, Science and Mathematics. These loans provide financial assistance to North Carolina residents who demonstrate need as determined by the board. Loans are available for study in the medical fields, mathematics, and science programs that lead to a degree. The applicant must be a domiciliary of North Carolina and accepted as a full-time student in an accredited associate, baccalaureate, master's, or doctoral program leading to a degree. Loan recipients in some professional or allied health programs may cancel their loans through approved service in shortage areas, public institutions, or private practice. Medical students may receive \$6,000 per year for each of the four years; master's degree students are eligible for two loans of \$3,000 each; bachelor's degree students are eligible for three loans of \$2,500 each. For application forms and more information write: Executive Secretary, Board for Need-Based Student Loans, 116 West Jones Street, Raleigh, North Carolina 27605, or telephone (919)733-2164.

Health Education Assistance Loans. These loans are available to accepted or enrolled students. There is an annual maximum, and interest, higher than need-based loans, is payable until repayment of principal begins. A special application is required.

Federally or State Insured (Guaranteed) Student Loans. FISL/GSL are available from many home-town banks. The annual maximum for medical students is \$5,000 with an aggregate maximum of \$25,000. Parental financial information is required and the bank may have an annual maximum less than the above figure. The eight percent interest is federally subsidized until repayment begins six months after graduation. Previous borrowers on the insured loan program will pay seven percent interest and have a nine-to twelve-month grace period.

Additional information, including a financial aid brochure and approved student budgets, may be obtained by writing Coordinator of Financial Aid, Box 3005, Duke University Medical Center, Durham, North Carolina 27710.

Courses of Instruction



An asterisk placed after the course number indicates that the course is also offered in the Graduate School.

Anatomy

James B. Duke Professor: J. David Robertson, M.D. (Harvard, 1945), Ph.D. (Massachusetts Inst. of Tech., 1952), *Chairman*.

Professors: Matthew Cartmill, Ph.D. (Chicago, 1970); Sheila J. Counce, Ph.D. (Edinburgh, 1954); Harold P. Erickson, Ph.D. (Johns Hopkins, 1969); William C. Hall, Ph.D. (Duke, 1967); William L. Hylander, D.D.S. (Illinois, 1963), Ph.D. (Chicago, 1972); Richard F. Kay, Ph.D. (Yale, 1973); R. J. Reynolds Industries Professor in Medical Education Montrose J. Moses, Ph.D. (Columbia, 1949); Robert B. Nicklas, Ph.D. (Columbia, 1958); James B. Duke Professor Elwyn Simons, Ph.D. (Princeton, 1956; Oxford, 1959).

Associate Professors: Joseph M. Corless, M.D., Ph.D. (Duke, 1972); Eric L. Effmann, M.D. (Indiana, 1967); William Longley, Ph.D. (London, 1963); Thomas J. McIntosh, Ph.D. (Carnegie Mellon, 1973); Michael K. Reedy, M.D. (Washington, 1962); E. Lee Tyrey, Ph.D. (Illinois, 1969).

Assistant Professors: Frank H. Bassett III, M.D. (Louisville, 1957); Nell B. Cant, Ph.D. (Michigan, 1973); M. Joseph Costello, Ph.D. (Duke, 1971); Barbara J. Crain, Ph.D. (Duke, 1978); David Fitzpatrick, Ph.D. (Duke, 1982); William E. Garrett, Jr., M.D., Ph.D. (Duke, 1976); Emma R. Jakoi, Ph.D. (Duke, 1973); Michael K. Lamvik, Ph.D. (Chicago, 1976); Chia-Sheng Lin, Ph.D. (Vanderbilt, 1976); Ross D. MacPhee, Ph.D. (Alberta, 1977); Patricia M. Saling, Ph.D. (Pennsylvania, 1979); Frederick H. Schachat, Ph.D. (Stanford, 1974); Kathleen K. Smith, Ph.D. (Harvard, 1980).

Assistant Medical Research Professors: Hie Ping Beall, Ph.D. (Tulane, 1967); David A. Kopf, Ph.D. (Chicago, 1980); Alan D. Magid, Ph.D. (Washington, 1974); Richard B. Marchase, Ph.D. (Johns Hopkins, 1976); Darrell R. McCaslin, Ph.D. (Duke, 1979); Jane S. Richardson, M.A. (Harvard, 1966); Kenneth A. Taylor, Ph.D. (Berkeley, 1975).

Lecturer: Irving T. Diamond, Ph.D. (Chicago, 1953).

Research Associates: Friderun Ankel-Simons, Ph.D.; Margaret M. Briggs, Ph.D.; Michael Cook, Ph.D.; Leonidas S. Cordova, M.S.; Walter Fowler, Ph.D.; Janet A. Hall, M.S.; Eric Hallman, Ph.D.; Mary K. Izard, Ph.D.; Patricia A. Poorman, A.M.; Dennis Raczkowski, Ph.D.; Mary C. Reedy, M.S.; Athy Robinson, M.S.

Research Scientist: William A. Voter, A.M.

Emeriti: Kenneth L. Duke, Ph.D. (Duke, 1940); John W. Everett, Ph.D. (Yale, 1932).

Required Courses

During Term 1, first-year students are required to take Gross Anatomy (ANA-200), Microanatomy (ANA-201), and Neuroanatomy (ANA-202). All instruction is designed to be informal and individualized. The general principles and functional viewpoint of living anatomy are emphasized and, whenever possible, fresh tissues and living cells are used.

ANA-200. Gross Anatomy. Students dissect the entire human body except the brain. Formal classroom lectures relate structures of the human body to their developmental and phylogenetic antecedents and the clinical significance of anatomical facts. Informal lectures are presented to small groups. Filmed lectures and prosections are available to students for laboratory and library study.

ANA-201. Microanatomy. The structural organization of different tissues and organs, as determined by light and electron microscopy, is covered in lecture. Other biochemical and biophysical studies are presented to relate structure to function, especially at the cellular level. The laboratory provides practical experience with light microscopy studies and analysing on extensive collection of prepared slides.

ANA-202. Neuroanatomy. Neuroanatomy and neurophysiology are taught concurrently to correlate these fields. Patients will be presented by faculty members in clinical neurology and neurosurgery. The major portion of the course is organized by systems, e.g., sensory, visual, auditory, olfactory, and motor including cerebellar, autonomic, hypothalamic, and limbic mechanisms.

Electives

ANA-214(B). * Anatomy of the Head and Neck. This course is designed to be a review of the head and neck, emphasizing its phylogenetic and ontogenetic development along with clinically important features of the anatomy of this region. Weight: 2. *Smith, Hylander, and Kay*

ANA-217(B). * Structure and Function of Visual Photoreceptors. A detailed study of available structural, biochemical, spectroscopic, and physiological data from retinal photoreceptors. Emphasis on molecular structure of vertebrate photoreceptor membranes, effects of bleaching on rhodopsin molecules, and initiation of neural information after photon absorption. Format to combine lectures, seminars, and demonstrations. Offered alternate years. Weight: 3. *Corless and McCaslin*

ANA-221(B). * Anatomy of the Trunk. Emphasis will be on the anatomy of the thoracic, abdominal, and pelvic organs, including relationships, blood supply and innervations, and, where practical, developmental and microscopic anatomy. The dissections will be supplemented with audiovisual presentations and discussions and with such prosections as are available. Weight: 2. *Staff*

ANA-224(B). Tutorial in Gross Anatomy. A detailed review of selected regions of the human body in the context of the core gross anatomy sequence. Student will plan, with staff, prosections, special presentations, etc. Students will elect to study one or more selected region in consultation with the staff. Weight: 1-5. *Staff*

ANA-231(B). Anatomy of Back and Extremities. Complete dissection of back and extremities, including pectoral and pelvic girdles. Visual aids will be used extensively. Course planned for orthopaedics, general practice, or neurosurgery. Weight: 3. *Bassett and staff*

ANA-259(B). * Molecular Biology I. Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Weight: 3. *Erickson, D. Richardson, Bell, Rajagopalan, and J. Richardson.*

ANA-266(B). Comparative Neurobiology. The evolution and functional organization of the vertebrate brain. A study of the original papers of the great pioneers in evolution, neuro-psychology, and neuroanatomy. Weight: 3. *Hall and Diamond*

ANA-269(B). * Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Weight: 3. *McIntosh and staff*

ANA-286(B). * Electron Microscopy and Related Techniques. Lectures and laboratories on methods of ultrastructure research. Fundamentals of optics; the light

microscope, phase, polarizing, and interference microscopy. Basics of electron microscopy, staining, sectioning, and replication techniques. Optical and computer image processing. Introduction to X-ray diffraction theory and apparatus in structure biological determination. Weight: 4. *Longley*

ANA-311(B). Concepts in Cell Biology. Evaluation of models currently used to describe cell biological processes with emphasis on analysis of experimental evidence in the scientific literature. Topics include: membrane structure, cell surface interactions in development, and muscle and cell motility. Prerequisite: Permission of the instructor. Weight: 3-8. *Schachat and Jakoi*

ANA-340(B). * Tutorial in Advanced Anatomy. Selected topics will be chosen for intensive reading and discussion. Topics may be chosen related to basic problems of cytology, growth and development, biophysics, endocrinological control, neuroanatomy, physiological differentiation and evolutionary origins of functional microsystems. Weight: 1-3 per term. *Anatomy faculty*

ANA-354(B). * Research Techniques in Anatomy. A preceptorial course in various research methods in anatomy including electronmicroscopy. An interested student might engage in research in physical anthropology, molecular and cell biology, developmental biology, fetal physiology, or stereotaxic approaches to neuroendocrinology and neuroanatomy. Recent advances in methodology are stressed. Approval of the student by the faculty is required. Weight: 4-8. *Anatomy faculty*

ANA-411(B). * Molecular and Cellular Bases of Development and Differentiation. Emphasis is placed on the biochemistry of the cell surface as the basis of cell recognition, control of cell cycle, and overall tissue organization. An analysis of protein nucleic acid interactions in chromosome structure and function is considered in light of newer concepts of transcriptional and translational control. Studies also include nuclear cytoplasmic interactions as well as hormone induction of differentiation and development. The course is designed to study cellular differentiation and has been organized on a multidisciplinary level. The course is part of the lecture series of the Molecular and Cellular Basis of Differentiation Study Program. Weight: 3 and 4. *Counce, McCarty, Kaufman, and Padilla*

ANA-414(B). The Human Embryo. The first eight weeks of development are considered in detail, including fertilization, implantation, formation, and function of embryonic membranes and placenta, and establishment of major organ systems. Emphasis is placed on distinctive features of human embryogenesis, and on causes, identification, and treatment of congenital defects. Weight: 2. *Counce and Effman*

ANA-418(B). * Reproductive Biology. An indepth study of male and female reproductive processes including hypothalamic, pituitary, and gonadal control mechanisms as well as the physiology of pregnancy and parturition. Lectures by guest clinical faculty will emphasize the interface between basic science and clinical aspects. The lecture material in each section of the course is followed by seminar presentations which will contribute to ANA/PHS-424, a corequisite for the course. Also listed as PHS-418(B). * Weight: 2. *Tyrey, Anderson, and Schomberg*

ANA-424(B). * Reproductive Biology. Selected topics in reproductive biology will be chosen for in depth reading and analysis in the seminar format. The seminar is to be taken as a corequisite with ANA/PHS-418(B). Also listed as PHS-424(B). Weight: 1. *Tyrey, Anderson, and Schomberg*

Anesthesiology

Professor: W. David Watkins, M.D., Ph.D. (Colorado, 1975), *Chairman*.

Professors: Peter B. Bennett, Ph.D. (Southampton, England, 1964); Enrico M. Camporesi, M.D. (University of Milan, Italy, 1970); David A. Davis, M.D. (Vanderbilt, 1941); Kenneth D. Hall, M.D. (Duke, 1953);

Merel H. Harmel, M.D. (Johns Hopkins, 1943); Joannes H. Karis, M.D. (State Univ. of Utrecht, Holland, 1952); William J. Murray, Ph.D. (Wisconsin, 1955), M.D. (North Carolina at Chapel Hill, 1962); Lloyd F. Redick, M.D. (Ohio State, 1958); Joseph G. Reves, M.D. (Med. Coll. of South Carolina, 1969); Bruno J. Urban, M.D. (Albertus Magnus, Germany, 1960); Vartan Vartanian, M.D. (Cluj Univ. Med. School, Rumania, 1951); Stanley W. Weitzner, M.D. (New York Coll. of Med., 1953).

Associate Professors: Edmond C. Bloch, M.B., Ch.B. (Univ. of Cape Town, South Africa, 1946); Elisabeth J. Fox, M.B., B.S. (London Univ., 1955); Robert A. Kates, M.D. (Emory, 1977); Philip D. Lumb, M.B., B.S. (Univ. of London, 1974); Ingeborg H. Talton, M.D. (Frankfurt/Main, 1951), Ph.D. (Geissen, 1952).

Assistant Professors: Fiona G. M. Clements, M.D. (Duke, 1975); Norbertus P. deBruijn, M.D. (University of Groningen, The Netherlands, 1976); Michael S. Gorback, M.D. (Maryland, 1979); William J. Greeley, M.D. (Texas at Houston, 1976); Theodore F. Hoffman, Jr., M.D. (North Carolina at Chapel Hill, 1978); Robert W. Kalayjian, M.D. (California at San Francisco, 1971); Radaslav Kosanin, M.D. (Univ. of Belgrad, Yugoslavia, 1965); John B. Leslie, M.D. (Duke, 1976); Mohammad Maroof, M.D. (Liaquat Med. Coll., Pakistan, 1964); R. William McIntyre, M.D. (Univ. of British Columbia, 1970); Andrew Meyer, M.D. (New York, Downstate, 1969); Richard E. Moon, M.D., C.M. (McGill, 1973); Ziaur Rahman, M.B. (Prince of Wales Medical College, India, 1968); Dianne L. Scott, M.D. (North Carolina at Chapel Hill, 1978); Jennifer E. Taylor, M.D. (Maryland, 1978).

Assistant Medical Research Professors: Fritz F. Klein, Ph.D. (Duke, 1973); Ying-Fu Su, Ph.D. (Colorado, 1978); Richard Vann, Ph.D. (Duke, 1976).

Assistant Clinical Professor: John A. Jarrell, Jr., M.D. (Johns Hopkins, 1949).

Associates: Paolo Flezzani, M.D. (Univ. of Bologna, Italy, 1977); John J. Freiberger, M.D. (Southwestern, 1979); Peter S. A. Glass, M.D., B.Ch. (University of the Witwatersrand, South Africa, 1976); Jennie A. Mace, M.D. (Florida, 1980); James F. O'Neill, Jr., M.D. (Duke, 1980); Timothy J. Quill, M.D. (Ohio, 1980).

Adjunct Professor: Kwen Jen Chang, Ph.D. (New York at Buffalo, 1972).

Adjunct Assistant Professors: Larry W. Burton, Ph.D. (Duke, 1977); David M. Cocchetto, Ph.D. (Duke, 1983); Marc D. Rafal, Ph.D. (Duke, 1980).

Adjunct Assistant Medical Research Professor: Wayne A. Gerth, Ph.D. (California at San Diego, 1979).

Clinical Associate: Joel S. Goldberg, M.D. (Duke, 1977).

Electives

ANE-240(C). Clinical Anesthesiology. This course will be organized into two segments. During the first two weeks of this course, each student will be assigned on a weekly basis to one staff anesthesiologist who will provide for that student daily in the operating room. It will be the goal of the staff to expose the students to as many procedures (intubations, IVs, etc.) and as much intra-operative patient care as possible. In addition to this clinical work, there will be an introductory series of ten lectures offered daily at 4 P.M. covering basics such as preoperative evaluation, airway management, and the pharmacology of anesthetic agents. The second segment of this course will be as flexible as possible with students signing on for a minimum of two, but up to six weeks of electives within the department. These electives are as follows: (a.) Clinical Anesthesiology II—Essentially an extension of the initial two-week core, dealing with the enhancement of technical skills and understanding of general anesthesia dealing with orthopaedics, urology, and general surgery. (b.) Pediatric Anesthesiology—Children of all ages with varied surgical procedures. Emphasis on differences between pediatric and adult anatomy, physiology, anesthetic requirements, and management in general. (c.) Obstetric Anesthesiology—One week on Carter Ward with emphasis on indications for and management of anesthesia for labor, delivery, and C-sections. Review of local anesthetics included. (d.) Neurosurgical Anesthesiology—Management of elevated intracranial pressure, air embolism, cerebral protection, and the anesthetic implications of head injuries in the neurosurgical operating rooms. Review of regional techniques included. (e.) Cardiovascular Anesthesiology—A one to two-week course in CVT anesthesia. Will concern the student with the hemodynamic management of patients undergoing open heart surgery. (f.) SICU/Recovery—One or two weeks in the SICU and recovery room as described for ANE 241 (C). (g.) Pain Clinic—Elective dealing with the role of the anesthesiologist in a pain clinic involving observation and participation in a multidisciplinary approach to patients disabled with chronic pain. Weight: 2-8. *Watkins and staff*

ANE-241(C). SICU/Recovery. Four weeks may be spent in the SICU/Burn/Trauma Unit participating in the care of a wide variety of patients with critical surgical illnesses. The students will participate in morning and afternoon rounds with SICU attendings and residents, and will be offered lectures on aspects of critical care several times per week. Exposure to problems of management in the recovery room is provided, as well as opportunities to learn procedures and techniques necessary for the management of severely ill patients (e.g., vascular catheterization, hemodynamic monitoring, and mechanical ventilation). Weight: 4. *Gorback and staff*

ANE-242(C). Anesthesiology Research. In collaboration with the faculty, the student may work on a research project related to the physiology and pharmacology of anesthetics in a laboratory or clinical setting. Weight: 8. *Watkins and staff*

Biochemistry

James B. Duke Professor Robert L. Hill, Ph.D. (Kansas, 1954), *Chairman*.

Professors: Robert M. Bell, Ph.D. (California at Berkeley, 1970); James B. Duke Professor Irwin Fridovich, Ph.D. (Duke, 1955); Samson R. Gross, Ph.D. (Columbia, 1953); Walter R. Guild, Ph.D. (Yale, 1951); Jerome S. Harris, M.D. (Harvard, 1933); Henry Kamin, Ph.D. (Duke, 1948); Norman Kirshner, Ph.D. (Pennsylvania State, 1952); Kenneth S. McCarty, Ph.D. (Columbia, 1957); Paul Modrich, Ph.D. (Stanford, 1973); K. V. Rajagopalan, Ph.D. (Univ. of Madras, 1957); Lewis Siegel, Ph.D. (Johns Hopkins, 1965); Leonard D. Spicer, Ph.D. (Yale, 1968); Robert Webster, Ph.D. (Duke, 1965).

Associate Professors: Ronald C. Greene, Ph.D. (California Inst. of Tech., 1954); Arno L. Greenleaf, Ph.D. (Harvard, 1974); Bernard Kaufman, Ph.D. (Indiana, 1961); William S. Lynn, Jr., M.D. (Columbia, 1946); David C. Richardson, Ph.D. (Massachusetts Inst. of Tech., 1967); Harvey J. Sage, Ph.D. (Yale, 1958); Deborah A. Steege, Ph.D. (Yale, 1974); J. Bolling Sullivan, Ph.D. (Texas, 1966).

Assistant Professors: Michael Herschfield, M.D. (Pennsylvania, 1967); Edward Holmes, M.D. (Pennsylvania, 1967); Tao-shih Hsieh, Ph.D. (California, 1976); Nicholas Kredich, M.D. (Michigan, 1962); Robert Lefkowitz, M.D. (Columbia, 1966); Patrick A. McKee, M.D. (Oklahoma, 1962); Salvatore V. Pizzo, M.D., Ph.D. (Duke, 1973); Allen David Roses, M.D. (Pennsylvania, 1967); Robert W. Wheat, Ph.D. (Washington, 1955).

Associate Medical Research Professor: Jane S. Richardson, M.S., M.S.T. (Harvard, 1966).

Adjunct Assistant Professor: Per-Otto Hagen, F.H.W.C. (Watt Univ. Scotland, 1961).

Research Associates: Wayne F. Beyer, Jr., Ph.D.; Walter R. Bishop, Ph.D.; Doug J. Darr, Ph.D.; Michel Deschuyteneer, Ph.D.; Allen Échardt, Ph.D.; Barry Ganong, Ph.D.; Barbara Hindenach, Ph.D.; Jean Johnson, Ph.D.; Mikko Jokinen, Ph.D.; Thomas Kirby, Ph.D.; Robert Lahue, Ph.D.; Carson R. Loomis, Ph.D.; Javier Lopez, Ph.D.; Ann Mary, Ph.D.; Robert J. Mullin, Ph.D.; Tetsuo Nagano, Ph.D.; Gianni Pozzi, Ph.D.; David Price, Ph.D.; Christopher Privalle, Ph.D.; Mark Scheidler, Ph.D.; Albert Smith III, Ph.D.; Norman E. Tandy, Ph.D.; Brian J. Terry, Ph.D.; Moses Vijayakumar, Ph.D.; Katherine Welsh, Ph.D.; Lawrence Young, Ph.D.

Emeriti: Mary L. C. Bernheim, Ph.D.; Yashiko Nozaki, Ph.D.

Required Courses

BCH-200. The core course given to all freshman medical students during a period of thirteen weeks in the first term—emphasizes the relationship between structure and function of the major classes of macromolecules in living systems including proteins, carbohydrates, lipids, and nucleic acids. The metabolic interrelationships and control mechanisms are discussed as well as the biochemical basis of human diseases.

BCH-201. The required course in genetics for all first-year students is given during four weeks at the end of the first term. The course considers the fundamental processes of heredity from a biochemical viewpoint, together with a brief survey of classical genetics to provide context for the molecular phenomena. Its purpose is to provide an adequate background to allow the student to communicate with professional geneticists and to understand the new molecular and cellular techniques for analysis of the human genome and evaluation of the genetic aspects of disease.

Electives

BCH-215(B). Molecular Genetics I: Genetic Mechanisms. A study of genetic mechanisms in molecular terms with emphasis on gene function, segregation and

regulation in procaryotes and eucaryotes. The systems covered will include bacterial viruses, bacteria, plasmids, cellular organelles, and selected lower and higher eucaryotes. Course material will be drawn from the original literature and will be integrated as much as possible with Biochemistry 268. Weight: 3. *Gross and staff*

BCH-219(B). * Molecular and Cellular Bases of Development and Differentiation. Emphasis is placed on the biochemistry of the cell surface as the basis of cell recognition, control of cell cycle, and overall tissue organization. An analysis of protein nucleic acid interactions in chromosome structure and function are considered in light of newer concepts of transcriptional and translational control. Studies also include nuclear cytoplasmic interactions as well as hormone induction of differentiation and development. The course is designed to study the phenomena of development and differentiation and has been organized on a multidisciplinary level. The course is part of the lecture series of the Molecular and Cellular Basis of Differentiation Study Program, MCD-301(B). Weight: 3-4. *McCarty, Counce, Kaufman, and Padilla*

BCH-234(B). Metabolic-Genetic Disease Seminar. Diseases of metabolism studied in detail with an emphasis on human genetics and inborn errors of metabolism. Format includes staff lectures, student seminars, patient presentations, textbook and literature reading. The group will be small enough to permit maximal personal interaction, particularly between students and faculty. Weight: 3. *Kredich, Gross, Hill, and Holmes*

BCH-259(B). * Molecular Biology I. Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Weight: 3. *Vanaman, Bell, Erickson, Rajagopalan, and J. Richardson*

BCH-268(B). * Molecular Biology II. Nucleic Acids. Consideration of structure and metabolism of nucleic acids in the context of their biological function in information transfer. Emphasis will be on the current research literature. Weight: 3. *Modrich, Bastia, and Steege*

BCH-276(B). * Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques used include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Weight: 6 per 5 weeks. *Sullivan*

BCH-288(B). * The Carbohydrates and Lipids of Biological Systems. The subjects will be considered in the following two general categories: (1) The relationship between structure and function; particularly, (a) cell surface carbohydrates as antigenic determinants and their relationship to viral and carcinogen transformation, (b) connective tissue mucopolysaccharides, (c) structural features of lipids and phase transitions. (2) Biosynthesis and catabolism. Weight: 2. *Kaufman*

BCH-291(B). * Physical Biochemistry. Principles of thermodynamics, hydrodynamics, spectroscopy, and X-ray diffraction and scattering are applied to biological systems. Biological molecules and macromolecules in both soluble and crystalline states are discussed. Weight: 3. *Richardson, Hsieh, and Sage*

BCH-297(B). * Intermediary Metabolism. Lectures and student presentations on selected topics in the areas of metabolic regulation, bioenergetics, and other subjects

of current research interest in metabolism. Weight: 3. *Siegel, Bell, Hill, Fridovich, and Rajagopalan*

BCH-299(B). * Nutrition. This course will examine the experimental basis for the identification and quantitation of requirements for calories, macronutrients, and micronutrients (vitamins and minerals). It will deal with the biochemistry of nutrition, with the assessment of nutriture, and with the biological effects of deficiency or excess of nutrients. This course will seek to define optimal nutriture and will search for the factual bases (if they exist) for commonly held beliefs on the nutrition of individuals and populations. The course will consist of informal lectures and, if possible, student seminars. Weight: 2. *Kamin*

BCH-357(B). * Research in Biochemistry. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per term. *Biochemistry faculty*

BCH-358(B). * Research in Biochemistry. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Weight: 1-8 per term. *Biochemistry faculty*

BCH-360(B). Clinical Chemistry Laboratory. Medical students may participate in the program of the Clinical Chemistry Laboratory on a tutorial basis. The course is tailored to the student's particular training needs. Students must receive the permission of the instructor. Weight: 4. *Bittikofer*

Community and Family Medicine

Professor: University Distinguished Service Professor of Community and Family Medicine E. Harvey Estes, Jr., M.D. (Emory, 1947), *Chairman*.

Associate Professors: Stephen H. Gehlbach, M.D. (Western Reserve, 1968), M.P.H. (North Carolina at Chapel Hill, 1974), *Research Coordinator*; George R. Parkerson, M.D. (Duke, 1953), M.P.H. (North Carolina at Chapel Hill, 1977), *Education Coordinator*.

DIVISION OF BIOMETRY

Associate Professor: William E. Wilkinson, Ph.D. (North Carolina at Chapel Hill, 1968); *Chief*.

Professors: Thomas E. Frothingham, M.D. (Harvard, 1951); William E. Hammond, Ph.D. (Duke, 1967); Max A. Woodbury, Ph.D. (Michigan, 1948).

Associate Professor: Kerry L. Lee, Ph.D. (North Carolina at Chapel Hill, 1974).

Assistant Professors: Daniel G. Blazer II, M.D. (Tennessee, 1969); Shirley A. Beresford, Ph.D. (Univ. of London, 1981); Elizabeth R. Delong, Ph.D. (North Carolina at Chapel Hill, 1979); Frank E. Harrell, Jr., Ph.D. (North Carolina at Chapel Hill, 1979); Carol C. Hogue, Ph.D. (North Carolina at Chapel Hill, 1974); Kathryn Magruder-Habib, Ph.D. (North Carolina at Chapel Hill, 1978); Lawrence H. Muhlbaier, Ph.D. (North Carolina at Chapel Hill, 1981).

Associate Medical Research Professor: Kenneth G. Manton, Ph.D. (Duke, 1974).

Assistant Medical Research Professor: Deborah V. Dawson, Ph.D. (North Carolina at Chapel Hill, 1981).

Research Associate: Michael Helms, B.S. (North Carolina at Chapel Hill, 1971).

DIVISION OF COMMUNITY AND OCCUPATIONAL MEDICINE

Assistant Professor: David C. Deubner, M.D. (Rochester, 1971), M.P.H. (North Carolina at Chapel Hill, 1973); *Chief*.

Professors: David M. Eddy, Ph.D. (Stanford, 1978); Leon Golberg, M.B., B.Chir. (Univ. Coll. Hospital Med. School, London, 1951); Clark C. Havighurst, J.D. (Northwestern, 1958); Siegfried H. Heyden, M.D. (Univ. of Berlin, Germany, 1951); Harmon L. Smith, Ph.D. (Duke, 1962); David G. Warren, J.D. (Duke, 1964).

Associate Professors: John K. Crellin, Ph.D. (Univ. of London, 1969), L.R.C.P., M.R.C.S. (Univ. of London, 1974); James F. Gifford, Jr., Ph.D. (Duke, 1969); Joseph Lipscomb, Jr., Ph.D. (North Carolina at Chapel Hill, 1975).

Assistant Professors: Deborah Bender, Ph.D., (American, 1980), M.P.H. (North Carolina at Chapel Hill, 1981); William B. Bunn, M.D., J.D. (Duke, 1979); Allen R. Dyer, M.D. (Duke, 1972); John B. Nowlin, M.D. (Duke, 1959); Ruby L. Wilson, Ed.D. (Duke, 1968).

Adjunct Assistant Professor: Diana E. McGrath, Ph.D. (Pennsylvania, 1974).

Clinical Associate Professor: George W. Jackson, M.D. (Western Reserve, 1968).

Associate: Catherine M. Severns, R.N.P. (Yale, 1971).

Clinical Assistant Professors: Melvin Berlin, M.D. (Duke, 1953); Susan E. Brown, M.D. (Georgetown, 1976); Joyce A. Copeland, M.D. (North Carolina at Chapel Hill, 1975); John W. Cromer, Jr., M.D. (Nebraska, 1972); Howard J. Eisenson, M.D. (Duke, 1979); Barbara Morris, M.D. (Rochester, 1979); Henry B. Perry II, M.D. (Johns Hopkins, 1974), Ph.D. (Johns Hopkins, 1976); Woodhall Stopford, M.D. (Harvard, 1969); Wayne R. Thoman, Ph.D. (North Carolina at Chapel Hill, 1983).

Medical Research Professor: Merrill Eisenbud, B.S.E.D.Sc.D., D.H.C., (New York University, 1936).

DIVISION OF FAMILY MEDICINE

Associate Professor: Samuel W. Warburton, Jr., M.D. (Pennsylvania, 1969); *Chief*.

Associate Professors: Stephen H. Gehlbach, M.D. (Western Reserve, 1968), M.P.H. (North Carolina at Chapel Hill, 1974); George R. Parkerson, M.D. (Duke, 1953), M.P.H. (North Carolina at Chapel Hill, 1977); Robert J. Sullivan, Jr., M.D. (Cornell, 1966), M.P.H. (North Carolina at Chapel Hill, 1973).

Assistant Professors: Kathryn A. Andolsek, M.D. (Northwestern, 1975); Don W. Bradley, M.D. (Med. Coll. of Virginia, 1976); Frank V. De Gruy III, M.D. (South Alabama Coll. of Med., 1977); James L. Michener, M.D. (Harvard, 1978); Katherine A. Munning, Ph.D. (Iowa, 1979); Gregg A. Warshaw, M.D. (Michigan, 1976).

Clinical Assistant Professors: James T. Moore, M.D. (University of Missouri, 1971); R. Derek Prentice, M.B., Ch.B. (Edinburgh Univ., Scotland, 1970).

Clinical Associates: Hendy H. Buckley, Ph.D., (Duke, 1980); Fred Fox, M.D., (New Mexico, 1981); Marci J. Kramish, M.P.H. (North Carolina at Chapel Hill, 1977); Valerie Proffitt, R.P.A. (Bowman Gray, 1973); Patricia Pressley, F.N.P. (North Carolina at Chapel Hill, 1979).

Clinical Instructor: Joseph W. Kertesz, Jr., M.A. (Michigan, 1973).

Research Associates: James M. Schmidt, B.H.S. (Duke, 1974); William T. Vaughan, B.S. (North Carolina at Chapel Hill, 1972).

DIVISION OF PHYSICIAN'S ASSISTANT TRAINING

Assistant Professor: Reginald D. Carter, Ph.D. (Bowman Gray, 1970), *Chief*.

Assistant Professor: Michael A. Hamilton, M.D. (Rochester, 1964), *Medical Director*.

Associate Professor: Arthur C. Christakos, M.D. (South Carolina, 1955).

Assistant Professor: Malcolm Henderson Rourke, Jr., M.D. (Pennsylvania, 1963).

Assistant Clinical Professor: Marcia E. Herman-Giddens, B.H.S. (Duke, 1978).

Clinical Associate: John C. Lord, B.H.S. (Duke, 1981); Jan Victoria Scott, B.H.S. (Duke, 1981).

Instructors: Leaf R. Diamant, M.Ed. (North Carolina at Chapel Hill, 1973); Joyce Nichols, R.P.A. (Duke, 1970).

DUKE DIET AND FITNESS CENTER

Assistant Professor: Michael A. Hamilton, M.D. (Rochester, 1964), *Chief*.

Clinical Assistant Professors: Ronette L. Kolotkin, Ph.D. (Minnesota, 1978); Sigrid J. Nelius, M.D. (Ludwig Maximilian, Germany, 1949).

Instructor: Elaine S. Revis, M.A. (Case Western Reserve, 1981).

Adjunct Faculty

Adjunct Professors: Mario C. Battigelli, M.D. (Univ. of Florence, Italy, 1951), M.P.H. (Pittsburgh, 1957), Chapel Hill, N.C.; Barbara S. Hulka, M.D. (Columbia, 1959), M.P.H. (Columbia, 1961), Chapel Hill, N.C.

Adjunct Associate Professor: Richard J. Levine, M.D. (St. Louis, 1971), Research Triangle Park, N.C.

Adjunct Assistant Professors: James D. Bernstein, M.H.A. (Michigan, 1968), Raleigh, N.C.; Thomas R. Howerton, A.B. (Duke, 1946), Durham, N.C.; Ralph E. Jennings, B.S. (East Tennessee, 1955), Durham, N.C.; Lars C. Larsen, M.D. (New York at Syracuse, 1973), Fayetteville, N.C.; Lawrence E. Myers, Ph.D. (California at Berkeley, 1972), Research Triangle Park, N.C.; Josephine E. Newell, M.D. (Maryland, 1949), Raleigh, N.C.

Adjunct Associate: Lynn C. Hartwig, M.A. (North Carolina at Chapel Hill, 1972), Hattiesburg, Miss.

Clinical Faculty

Clinical Professor: Donald M. Hayes, M.D. (Bowman Gray, 1954), Greensboro, N.C.

Clinical Associate Professors: Charles Ellenbogen, M.D. (Chicago-Pritzker, 1964), Fayetteville, N.C.; William J. Kane, M.D. (Temple, 1969), Mount Holly, N.J.

Clinical Assistant Professors: James C. Abell, M.D. (North Carolina at Chapel Hill, 1966), Statesville, N.C.; Joseph E. Agsten, M.D. (North Carolina at Chapel Hill, 1973), Kinston, N.C.; Lawrence M. Alexander, M.D. (Duke, 1952), Sanford, N.C.; J. Powell Anderson, M.D. (Duke, 1949), Waynesboro, Va.; Evan A.

Ballard, M.D. (Duke, 1976), Jonesville, N.C.; Tracy E. Barber, M.D. (Temple, 1943), Lexington, N.C.; Daniel H. Barco, M.D. (Duke, 1972), Durham, N.C.; James E. Barham, M.D. (Duke, 1974), Anderson, S.C.; William J. Blackley, M.D. (North Carolina at Chapel Hill, 1975), Elkin, N.C.; James S. Blair, Jr., M.D. (Maryland, 1947), Wallace, N.C.; Donald E. Bley, M.D. (Duke, 1972), Fredericksburg, Va.; Jack R. Cahn, M.D. (Pennsylvania State, 1972), Sparta, N.C.; Walker H. Campbell, M.D. (Med. Coll. of Virginia, 1963), Goldsboro, N.C.; Jane T. Carswell, M.D. (Med. Coll. of Virginia, 1958), Lenoir, N.C.; Jerry Cassuto, M.D. (New York Med. Coll., 1956), Greensboro, N.C.; Robert S. Cline, M.D. (North Carolina at Chapel Hill, 1957), Sanford, N.C.; Charles Davant, Jr., M.D. (Med. Univ. of South Carolina, 1945), Blowing Rock, N.C.; John D. Davis, Jr., M.D., (North Carolina at Chapel Hill, 1978); Blowing Rock, N.C.; Clyde J. Dellinger, M.D. (Duke, 1961), Drexel, N.C.; John R. Dykers, Jr., M.D. (North Carolina at Chapel Hill, 1960), Siler City, N.C.; Curtis J. Eshelman, M.D. (Michigan, 1971), Durham, N.C.; Andrew L. Finn, Pharm.D. (Michigan, 1975), Research Triangle Park, N.C.; Lawrence L. Fleenor, M.D., (Virginia, 1966), Big Stone Gap, Va.; Stephen W. Friedman, M.D. (Tulane, 1971), Durham, N.C.; John S. Gaskins, Jr., M.D. (Duke, 1959), Fayetteville, N.C.; Harry I. Geisberg, M.D. (Louisville, 1972), Anderson, S.C.; Albino Gomez-Uria, M.D. (Madrid School of Medicine, 1962), Asheville, N.C.; Michael D. Gooden, M.D. (North Carolina at Chapel Hill, 1973), Goldsboro, N.C.; Wilbur J. Harley, M.D. (Jefferson, 1950), Winston-Salem, N.C.; Jeffrey S. Harris, M.D. (New Mexico, 1975), Nashville, Tenn.; James K. Hartye, M.D. (Vanderbilt, 1977), North Wilkesboro, N.C.; Francis E. Hayes, M.D. (Tufts, 1978), Concord, N.H.; Richard R. Honablu, M.D. (Meharry Med. Coll., 1974), Williamsburg, Va.; Paul O. Howard, M.D. (Virginia, 1955), Sanford, N.C.; Harold R. Imbus, M.D. (Cincinnati, 1954), Greensboro, N.C.; Peter Jacobi, M.D. (Case Western Reserve, 1979), Durham, N.C.; Lane E. Jennings, M.D. (Miami, 1975), Port Orange, Fla.; Pamela H. Jessup, M.D. (Bowman Gray, 1977), Sanford, N.C.; Eric M. Johnson, M.D. (Wayne State, 1977), Albemarle, N.C.; Lyndon K. Jordan, M.D. (Duke, 1961), Smithfield, N.C.; Hervy B. Kornegay, Sr., M.D. (Bowman Gray, 1957), Mount Olive, N.C.; Charles W. Lapp, M.D. (Albany Med. Coll, 1974), Raleigh, N.C.; Walter L. Larimore, M.D. (Louisiana, 1977), Bryson City, N.C.; Stephen C. Lies, M.D. (Duke, 1976), Goldsboro, N.C.; Richard V. Liles, Jr., M.D. (North Carolina at Chapel Hill, 1957), Albemarle, N.C.; Mary E. Lyon, M.D. (Boman Gray, 1977), Sparta, N.C.; Robert H. McConville, Jr., M.D. (Indiana, 1972), Sanford, N.C.; Dwight G. Malone, M.D. (Jefferson, 1976), Williamsburg, Va.; Yancey Mebane, M.D. (Duke, 1954), Mebane, N.C.; Albert A. Meyer, M.D. (State Univ. of New York, 1975), Thomasville, Ga.; Robert S. Meyer, M.D. (Temple, 1974), Mount Olive, N.C.; David E. Miller, M.D. (Duke, 1973), Fayetteville, N.C.; James W. Mold, M.D. (Duke, 1974), Hillsborough, N.C.; Gerald G. Mulvaney, M.D. (Boston, 1978), Goldsboro, N.C.; John W. Nance, M.D. (Boman Gray, 1948), Clinton, N.C.; Donald D. Neish, M.D. (Temple, 1958), Durham, N.C.; Robert B. Nieland, M.D. (Iowa, 1969), Hickory, N.C.; Talbot F. Parker, Jr., M.D. (Jefferson, 1951), Goldsboro, N.C.; Henry B. Perry II, M.D., Ph.D. (Johns Hopkins, 1974, 1976); Bolivia; Melvin T. Pinn, M.D. (Virginia, 1976), Charlotte, N.C.; Eric A. Pyeritz, M.D. (Pittsburgh, 1978), Bryson City, N.C.; Calvin Reams III, M.D. (Miami, 1975), Thomasville, N.C.; David C. Rockmore, M.D. (Med. Coll. of Virginia, 1975), Statesville, N.C.; Charles P. Scheil, M.D. (Duke, 1958), Lenoir, N.C.; Evelyn D. Schmidt, M.D. (Duke, 1951), Durham, N.C.; Harold D. Schutte, M.D. (Loma Linda, 1962), Asheville, N.C.; Jessica Schorr, M.D. (Tufts, 1977), Charlotte, N.C.; Daniel J. Semenoff, M.D. (St. Louis, 1963), Fayetteville, N.C.; Robert H. Shackelford, M.D. (Bowman Gray, 1947), Mount Olive, N.C.; Philip G. Singer, M.D. (Duke, 1975), Hillsborough, N.C.; Patricia J. Sparks, M.D. (Utah, 1975), M.P.H. (Harvard, 1977), Greensboro, N.C.; Van J. Stitt, M.D. (North Carolina at Chapel Hill, 1975), Fayetteville, N.C.; Hal M. Stuart, M.D. (Bowman Gray, 1956), Elkin, N.C.; William B. Tarry, Jr., M.D. (Med. Coll. of Virginia, 1953), Oxford, N.C.; Richard L. Taylor, M.D. (North Carolina at Chapel Hill, 1962), Oxford, N.C.; George R. Tucker, Jr., M.D. (North Carolina at Chapel Hill, 1955), Henderson, N.C.; W. Beverly Tucker, M.D. (North Carolina at Chapel Hill, 1966), Henderson, N.C.; Christopher Unger, M.D. (Pennsylvania, 1969), Bethesda, Md.; William B. Waddell, M.D. (Duke, 1962), Galax, Va.; Joseph E. Walker, M.D., (Duke, 1960), Galax, Va.; Joseph B. Warren, M.D. (Duke, 1951), New Bern, N.C.; John W. Watson, M.D. (Med. Coll. of Virginia, 1953), Oxford, N.C.; Millard W. Wester, Jr., M.D. (Duke, 1952), Henderson, N.C.; James M. Wetter, M.D. (New York at Buffalo, 1974), Fayetteville, N.C.; Abner C. Withers, M.D. (North Carolina at Chapel Hill, 1962), Morganton, N.C.

Clinical Associates: Bruce O. Bailey, M.D. (Ohio State, 1975), Fayetteville, N.C.; Robert F. Brown, M.D. (East Carolina, 1981), Stacy, N.C.; R. Scott Eden, M.D. (Duke, 1980); Michael D. Fried, M.D. (New York Univ., 1971), Chapel Hill, N.C.; Daniel Gottovi, M.D. (Rochester, 1965), Wilmington, N.C.; Peter J. Holland, M.D. (South Florida, 1977), Research Triangle Park, N.C.; David C. Jones, M.D. (Duke, 1979), Mebane, N.C.; Linda T. McAlister, M.D. (California at San Francisco, 1978), Fayetteville, N.C.; Marci Kramish, M.P.H. (North Carolina at Chapel Hill, 1977), Durham, N.C.; John W. Lane, M.D. (Duke, 1972), Chapel Hill, N.C.; Frank W. Leak, M.D. (North Carolina at Chapel Hill, 1967), Clinton, N.C.; Charles F. Martin, M.D. (Louisville, 1951), Greensboro, N.C.; Michael R. McIntyre, M.S.W. (Boston Coll., 1980), Fayetteville, N.C.; Latham C. Peak, M.D. (Bowman Gray, 1951), Clinton, N.C.; Andrew W. Robertson, M.D. (Texas, 1979), Fayetteville, N.C.; John L. Rouse III, M.D. (Bowman Gray, 1973), Clinton, N.C.; Robert F. Sample, Jr., M.D. (East Carolina, 1981), Sea Level, N.C.; Thomas W. Stearns, Ph.D. (Florida, 1980), Fayetteville, N.C.; Robert H. Taylor, Pharm. D. (Tennessee, 1977), Fayetteville, N.C.; James W. Turpin, M.D. (Emory, 1955), Fayetteville, N.C.; John S. Weiner, Pharm. D. (Michigan, 1982), Fayetteville, N.C.; Gregory K. Whitaker, M.D. (South Carolina, 1978), Fayetteville, N.C.

Emeriti: Leonard J. Goldwater, M.D.; Dorothy E. Naumann, M.D.; Eva J. Salber, M.D.

Required Course

CFM-205. Clerkship in Family Medicine. This basic course in family medicine consists of an eight-week clinical clerkship in the second year. The educational goal is that students understand the principles of family medicine and the application of these principles in community practice. Emphasis is placed upon the provision of continuous comprehensive health care for people of both sexes and all ages within the context of their personal social support groups in the communities where they live. Of particular importance are ambulatory care, continuity of care, management of common health problems, and health maintenance. Students also study social factors, such as the doctor-patient relationship, family dynamics, the role of the physician in the community, ethical and legal issues, and the economics of health care delivery.

The clerkship is a two-part experience, approximately half with full-time family medicine faculty in the ambulatory health care facilities in Durham closely affiliated with the Duke University Medical Center, and the other half with practicing family physicians in communities other than Durham, but principally within North Carolina. In both components of the course the learning experience is centered upon patients which students help manage under the guidance of the departmental faculty. Patients are seen in a variety of sites, including the office, home, nursing homes, public health clinics, and community hospitals.

This experience offers the student a broad and realistic perspective of medicine and its relationship to other important institutions in the community. It also provides a basis for understanding the interdependent relationships between community and referral center physicians.

Electives

CFM-212(B). Organization and Management of Ambulatory Care Centers. A series of seminars to discuss ambulatory care systems. Material covered will be of interest to all students who will work in an office setting. Emphasis will be placed on the group practice as a mechanism for providing ambulatory health services. Topics of discussion will include the conceptual basis for organizing ambulatory care centers; center objectives; automated subsystems for registration, appointments, diagnostic studies, health providers and managers; marketing; human relations; professional recruitment and group selection; financial forecasting and budgeting. During the second term, discussions will center around specific areas of interest with participation in direct application. Weight: 1-2. *Boggs*

CFM-215(B).† Biostatistics in the Medical Sciences. A practical approach to statistical methods and their use in medicine and the related health sciences. Particular emphasis will be placed on issues in the design, conduct, and interpretation of clinical and epidemiologic studies. The standard statistical concepts relating to data description and hypothesis testing, including test statistics, parameters, p-values, significance levels, power, and confidence intervals will be introduced in class lectures and will be reinforced through reading selected papers from the medical literature. The proper uses of test statistics in different situations will be demonstrated. Examples from real data and the medical literature will be used extensively. The student will reproduce some results through use of the computer. Weight: 2. *DeLong*

CFM-225(B).† Digital Computers and Their Application in the Health Sciences. For students desiring an intensive exposure to medical computer applications. The flexible format of the course permits a variety of projects in computer medicine.

†For further information, contact the Dean for Undergraduate Medical Education.

Examples include projects in interactive patient interviewing; computer-aided instruction; patient/physician education; data collection, organization, retrieval, display, and analysis; and physician-assist programs. Weight: 1-8. *Hammond*

CFM-226(B). Historical Studies in a Medical Specialty. This elective is offered primarily to those who have made the choice of their probable career specialty. It is intended to provide an appreciation of the developments in that specialty and thereby deepen an understanding of it. While the choice of elective topic will be made on an individual basis and depend on the interests of each student, emphasis generally will be placed on specific theoretical, practical, and organizational developments since the second half of the nineteenth century. The format comprises selected readings, tutorials and student project. Weight: 1 or 2. *Crellin, Gifford, and English*

CFM-227(B).† Medicine in America. The historical development of medical science, the medical profession, and patterns of medical care in the United States. Topics covered will include bases of authority for the practice of medicine, the standing of the physician in society, medical education, medical sects, the evolution of hospital care, medical organizations, and health care delivery systems. The history of the Duke University Medical Center provides a closing recapitulation of course themes. Additional units of credit may be earned through independent study. Weight: 1. *Gifford*

CFM-229(B).† The Development of and Perspectives on Modern Medicine. Comprising lectures, discussion, and readings, this course outlines the general history of medicine, with particular attention given to recent developments. The course will include such topics as the contributions of William Harvey, aspects of clinical diagnosis, and the evolution of key concepts in modern medicine such as cell theory, the germ theory, anticepsis, and theories of immunity. Full use will be made of the excellent resources of the Trent Collections. Additional units of credit may be earned through independent study. Weight: 1. *Gifford and Crellin*

CFM-230(B).† Comparison of Services for the Elderly—United States and United Kingdom. The delivery of services at the community level in the U.S. and U.K. will be compared. Problems will be discussed in terms of biology of aging, demography, utilization of health resources, economic and financial implications, and policy directions. Weight: 1. *Moore*

CFM-232(B).† Medical Uses of Computers. An introductory course on applications of computers in clinical medicine. Special emphasis is given to various methods of collecting data from patients and making such data available for computer analysis. Working computer applications in several medical environments will be considered as examples, including visits to these units. The student will, in addition to the above, be taught the principles of computer programming through an exposure to a higher level computer language. Experience will include the writing of simple computer programs and hands on experience with computers and computer input and output devices. Weight: 3. *Hammond*

CFM-233(B).† Occupational Medicine. (Formerly Medicine and Industry). Student participation in projects being conducted in the Division of Occupational Medicine. Background material will be presented covering history of occupational (industrial) medicine, labor legislation, workmen's compensation and the Occupational Safety and Health Act (OSHA) of 1970. Clinical and epidemiological aspects of occupational diseases will be included, with emphasis on industrial hygiene and toxicology. Organization and administration of employee health programs will also be considered, with visits to representative establishments as part of the experience. Typical projects include such matters as evaluation of chemical exposures in the work environment,

reactions of humans to chemical stress, medical evaluation of suspected cases of occupational disease. Weight: 6. *Cromer, Stopford, and Jackson*

CFM-234(B).* **Seminar in Occupational Medicine and Toxicology.** Seminar topics will relate to environmental hazards important in North Carolina. North Carolina has several important industries including agriculture, tobacco processing, textile manufacturing, and furniture manufacturing. Several occupational medicine physicians from local industries will be participants in this seminar series. Weight: 2. *Cromer and Stopford*

CFM-238(B).† **Tutorial in Community and Family Medicine.** An eight week, individually arranged experience in which the student participates in the research program of a faculty member. The subject matter, course weight, and meeting time will be arranged with the faculty member. Each student will meet regularly with the faculty preceptor and will carry out a project related to the preceptor's work. Through these discussions and project, the student will be able to develop an understanding of the discipline involved. Possible areas include management sciences, economic aspects of health care, computer technology, biostatistics, epidemiology, medical anthropology, health in the developing world, and organization of health care delivery in third world countries. Because of the variety of projects available and the necessity of prior arrangements, it is essential that interested students consult with the instructor or staff at least one month before the beginning of the term elected. Weight: 1-8 per term. *Parkerson and staff*

CFM-240(B).† **Epidemiologic Principles and Methods.** Topics covered in this course include study of the distribution of disease in populations, issues in study design, data collection, and methods of analysis. Modules on the subjects of case-control, cohort, and cross-sectional studies, clinical trials, and intervention studies are presented. Epidemiologic approaches to the study of cancer, coronary artery disease, evaluation of medical care, infectious diseases, and mental illness will be covered. Methods are also introduced for assessing and dealing with bias, misclassification, and confounding. Primary reference papers serve as the main text for the course to enable students to gain facility in critical review of medical literature. Lectures will be supplemented by outside readings, seminars, and student presentations. Weight: 2. *Grufferman, Blazer, Delzell, Feussner, Hamilton, and Kimm*

CFM-242(B).† **Nutrition Epidemiology.** Nutrition epidemiology may be defined as the study of the role of the nutrition factor in the *causal web* of illness patterns in human populations. This course offers a systematic review of population approaches to the study of nutrition. Currently, most nutrition courses are primarily concerned with studies using *in vitro* laboratory techniques, animal models, or individual human subjects, with minimal emphasis on human population groups in their natural environments. In the course, emphasis will be placed on methods available for chronic disease epidemiologic research since most nutritional disorders in man are basically chronic. Particular attention will be directed to principles of research design and critical analyses of selected studies. It is hoped that at the completion of the course, the student will be prepared to design and conduct population-based studies on human nutrition. Weight: 1-2. *Sue Y.S. Kimm*

CFM-219(C).† **Tutorial in Clinical Epidemiology.** Selected topics will be chosen for reading and discussion. Major emphasis is on cardio-cerebrovascular chronic-degenerative diseases, major neoplastic diseases, and industrial cancer screening; nutrition (cholesterol, sodium, potassium, 700 cal diet, etc.) Weight: 2. *Heyden*

CFM-221(C).† **The Computer Textbook of Medicine.** Students will participate in the writing and updating of the computer textbook of medicine. Information contained in the initial chapter of ischemic heart disease will be used to assist in the

management of patients on the cardiology service. Weight: 2 and 4. *Rosati, Pryor, Califf, Lee, and Harrell*

CFM-239(C). Community and Family Medicine Preceptorships. A preceptorship will be arranged for students to work with family physicians in community practice sites. In this way students can observe and participate in the delivery of health care to individual patients and their families within the context of the community in which they live. A wide variety of geographic locations and practice types are available. Students may study Durham County or other counties in North Carolina as well as communities in third world countries. Because of the necessity for prior arrangements with preceptors, it is essential that interested students contact the instructor as soon as possible and at least one month prior to the desired term. Weight: 4-9. *Parkerson and staff*

CFM-241(C).† Community Health Assessment. A tutorial in which the first term discussion will focus on various methods of assessing the health needs of a population. Particular emphasis will be given to the impact of cultural patterns of selected cultural and ethnic groups on the utilization of health services. In the second term tutorials will be of a practical nature and/or emphasize fieldwork. Students will visit one or more agencies concerned with the delivery, planning, or evaluation of health care. Weight: 1-3. *Bender and Hansen*

CFM-246(C).† Ethical Issues in Medicine. This seminar will examine ethical questions raised by modern biomedical science and technology, with special attention to their implications for primary care practitioners. It will offer both historical and systematic analysis, and attend to models of physician-patient relationships. Among topics for consideration will be ethical method; resource allocation, justice, and public policy; medical beneficence; and concepts of rights; together with selected practice-related issues (e.g., truth-telling, confidentiality, abortion, contraception, consent, definition and meaning of death, behavior modification, and the like). Weight: 1. *Smith*

CFM-247(C).† Philosophic Problems for Physicians. This seminar brings the resources of philosophy, literature, poetry, psychology, and sociology to bear on specific ethical and philosophical problems with which practicing physicians deal. The course proceeds with didactic and seminar presentations focusing on both medical-legal controversies and ethical dilemmas in the day-to-day practice of medicine. The historical as well as psychological roots of medical ethics will be explored in light of conflicting philosophies of science and medicine. The following topics will be among those offered for consideration: (1) the doctor-patient relationship and models of medicine; (2) ethical codes and laws; (3) meaning of informed consent; (4) abortion, euthanasia, eugenics, and definitions of death; (5) behavior control, psychotherapy, and psychosurgery in a free society; (6) medical judgment and medical regulations; (7) hypochondriasis, patient responsibility, and the unwanted patient; (8) professional detachment and commitment; and (9) value considerations in specialty choice. Weight: 2 or 4. *Dyer*

CFM-249(C).† Legal Issues in Medicine. A seminar which introduces participants to the basic approach of law and legal process to contemporary issues in medical care, including malpractice, hospital privileges, confidentiality, natural death, abortion and sterilization, consent/authorization for treatment, human experimentation, and peer review. Topics may be chosen by individual students. Common misconceptions about malpractice law and the rights of physicians and patients as well as the legal mechanisms for resolving disputes will be examined. Weight: 2. *Warren*

CFM-259(C). Advanced Clerkship in Family Medicine. Students will participate in the management of a wide variety of ambulatory patients at the Duke Family

Medicine Center or Pickens Family Practice in Durham on in the Duke-FAHEC Family Medicine Center in Fayetteville, N.C., under the guidance of faculty family physicians. Emphasis will be placed on comprehensive continuous care, and the rational and cost-effective approach to diagnosis and treatment. Weight: 2-8. *Parkerson and staff*

CFM-261(C). Family Medicine Continuity Experience. Students will manage patients in the Family Medicine Center under supervision of faculty family physicians two half-days a week. Continuity of care is emphasized by providing comprehensive medical care to specific families over periods of two to eight months. Weight: 2-8. *Parkerson and staff*

CFM-262(C). Field Study in Occupational Medicine. This eight-week course is intended to provide practical instruction in occupational medicine. It will include a minimum of sixteen hours of seminars, clinical experience in occupational medicine, a field experience at an established industrial health service, and a written analysis of an important occupational hazard within the industry. Weight 6. *Cromer and Stopford*

CFM-263(C). Relating to the Patient as a Family Doctor. Family dynamics and psychosomatic concepts are related to family medicine and primary care. Weight: 2. *Kertesz and de Gruy*

CFM-267(C). Team Training in Health Delivery. This course provides experience in the delivery of health care in settings which utilize a variety of health professionals such as physicians, counseling therapists, social workers, mid-level practitioners, health educators, etc. The student will learn about the team approach in the care of patients/clients through direct observation and participation in a clinical setting, as well as through assigned readings and tutorials. Prerequisite: permission of instructor. Weight: 4-8. *Hamilton, Proffitt, and Kertesz*

CFM-269(C). Methods of Recording and Analyzing Clinical Data. Methods of indexing patient problems are presented as a basis for research studies in medical care. Students will record problems of patients encountered on their clinical rotations and perform analyses on these data. Weight: 1-4. *Parkerson*

CFM-273(C).† The Ideal Physician. The elective will explore, from the perspectives of history and ethics, the concept of the ideal physician in relation to such figures as Hippocrates, Osler, and others, as well as students' and patients' conceptions of what a physician should be: technician and/or humanist. Weight: 1-2. *Dyer and medical history staff*

CFM-274(C).† The Ideal Patient. This elective will focus, using the disciplines of history and ethics, on the physician's relationship with the patient and how to deal with patients' expectations of what medicine has to offer. Topics highlighted will include the growth of medical technology, concepts of disease, psychosomatic medicine, and the medicalization of life. Weight: 1-2. *Dyer and medical history staff*

CFM-400(C). Geriatric Medicine. This elective is offered by the interdepartmental faculty of the Division of Geriatric Medicine. The student will work with faculty, fellows, and housestaff in a number of settings involved in the care of the geriatric patient. These will include the Geriatric Evaluation and Treatment Clinic (Duke), Geriatric Evaluation Unit and Clinic (Veterans Administration Medical Center), geriatric consultation services (Veterans Administration Medical Center, Durham County General Hospital, Duke), nursing home facilities, interactions with community services (Coordinating Council for Senior Citizens), home assessment, and others. Principles to be stressed will be biology and pathophysiology of aging; multiple clinical problems in the elderly; interdisciplinary team approach to evaluation, planning, and treatment; goals of maximal functional achievement and independence

for the elderly. The student will participate actively in the workup and management of patients in both inpatient and outpatient settings as well as become more familiar with the problems of the elderly in the community. Familiarity with the growing literature in geriatric medicine will be encouraged and the student will participate in seminars, lectures, and team meetings at the appropriate sites including the Duke Center for the Study of Aging. Weight: 4 or 8. *Cohen, Lyles, Becker, Warshaw, Sullivan, Moore, Andolsek, and others*

Medicine

James B. Duke Professor: Joseph C. Greenfield, Jr., M.D. (Emory, 1956) ; *Chairman*.

DIVISION OF ALLERGY, CRITICAL CARE, AND RESPIRATORY MEDICINE

Associate Professor: James D. Crapo, M.D. (Rochester, 1971); *Chief*.

Professors: C. Edward Buckley, M.D. (Duke, 1954); Johannes A. Kylstra, M.D. (Univ. of Leiden, 1952); William S. Lynn, M.D. (Columbia, 1946); Herbert A. Saltzman, M.D. (Jefferson, 1952); Herbert O. Sieker, M.D. (Washington Univ., 1948).

Assistant Professors: William J. Fulkerson, M.D. (North Carolina at Chapel Hill, 1977); Khalil Kariman, M.D. (Meshed, 1969); Douglas G. Kelling, M.D. (Harvard, 1972); Mark J. Knapp, M.D. (Wayne State, 1976); Neil MacIntyre, M.D. (Cornell, 1972); Claude Piantadosi, M.D. (Johns Hopkins, 1975); Lyn A. Thet, M.D. (Inst. of Med., Burma, 1971); Stephen L. Young, M.D. (California at San Francisco, 1968).

Assistant Medical Research Professors: Sambhu N. Bhattacharyya, Ph.D. (Univ. of Calcutta, 1969); Bruce Freeman, Ph.D. (California at Riverside, 1978) .

Associate in Medicine: Joel L. Dietz, M.D. (Tufts, 1977).

Medical Research Associates: Ling-yi Chang, Ph.D. (North Carolina State, 1982); Nelson Leatherman, Ph.D. (Michigan, 1967).

DIVISION OF CARDIOLOGY

James B. Duke Professor: Joseph C. Greenfield, M.D. (Emory, 1956); *Chief*.

Professors: Victor S. Behar, M.D. (Duke, 1961); Fred R. Cobb, M.D. (Mississippi, 1964); Walter L. Floyd, M.D. (Johns Hopkins, 1954); Yi-Hong Kong, M.D. (Natl. Defense Med. Ctr., Taiwan, 1958); James B. Duke Professor Robert J. Lefkowitz, M.D. (Columbia, 1966); James J. Morris, M.D. (State Univ. of New York, 1959); Robert H. Peter, M.D. (Duke, 1961); Walter Kempner Professor of Medicine Andrew G. Wallace, M.D. (Duke, 1959); Robert E. Whalen, M.D. (Cornell, 1956).

Associate Professors: Joseph R. Kisslo, M.D. (Hahnemann, 1967); Barbara C. Newborg, M.D. (Johns Hopkins, 1949); Edward Pritchett, M.D. (Ohio, 1971); Robert A. Rosati, M.D. (Duke, 1967); Harold C. Strauss, M.D. (McGill, 1964); Galen S. Wagner, M.D. (Duke, 1965); Robert Waugh, M.D. (Pennsylvania, 1966).

Associate Medical Research Professor: William M. Smith, Ph.D. (Duke, 1970)

Assistant Professors: Robert M. Califf, M.D. (Duke, 1978); Lawrence D. German, M.D. (Boston, 1976); Marcel Gilbert, M.D. (Laval Univ. 1966); Augustus O. Grant, M.D. (Univ. of Edinburgh, 1971); Michael B. Higginbotham, M.D. (Univ. of Melbourne, 1973); Kenneth G. Morris, M.D. (Ohio, 1972); Harry R. Phillips, M.D. (Duke, 1975); David B. Pryor, M.D. (Michigan, 1976); Richard S. Stack, M.D. (Wayne State, 1976); Gary L. Stiles, M.D. (Vanderbilt, 1975); Judith L. Swain, M.D. (California at San Diego, 1974); R. Sanders Williams, M.D. (Duke, 1974).

Assistant Medical Research Professors: Lars-Goran Ekelund, M.D. (Karolinska Instit., 1958); Philip McHale, Ph.D. (Duke, 1972); Judith C. Rembert, Ph.D. (North Carolina at Chapel Hill, 1972).

Associates: David S. Grierson, M.D. (Ohio, 1978); James A. Heinsimer, M.D. (Illinois, 1977); Mark A. Hlatky, M.D. (Pennsylvania, 1976); Jose Martin, M.D. (Miami, 1978); J. Randall Moorman, M.D. (Mississippi, 1978); Steven F. Roark, M.D. (Duke, 1978); Neal Shadoff, M.D. (Boston, 1978); Seth J. Worley, M.D. (Temple, 1978).

DIVISION OF DERMATOLOGY

Professor: Sheldon R. Pinnell, M.D. (Yale, 1963); *Chief*.

Assistant Professors: Russell P. Hall, M.D. (Missouri, 1975); John C. Murray, M.D. (Duke, 1977); Sheldon V. Pollack, M.D. (Univ. of Toronto, 1974).

Medical Research Associate: Saood Murad, Ph.D. (California at Davis, 1978).

Associates: Claude S. Burton, M.D. (Duke, 1979); Elise A. Olsen, M.D. (Baylor, 1978).

DIVISION OF CLINICAL PHARMACOLOGY

Associate Professor: James E. Nidel, M.D. (Miami, 1973), *Chief*.

Associate Professor: Thorir Bjornsson, M.D. (Univ. of Iceland, 1971).

DIVISION OF GASTROENTEROLOGY

Professor: Malcolm P. Tyor, M.D. (Duke, 1946); *Chief*.

Professor: Michael McLeod, M.D. (Duke, 1960).

Associate Professors: John T. Garbutt, M.D. (Temple, 1962); Paul G. Killenberg, M.D. (Pennsylvania, 1963); Thomas T. Long, M.D. (Bowman Gray, 1966); Charles M. Mansbach, M.D. (New York Univ., 1963); Steven H. Quarfordt, M.D. (New York Univ., 1960).

Assistant Professors: Jacqueline C. Hijmans, M.D. (Univ. of Leiden, 1951); James K. Roche, M.D. (Pennsylvania, 1969).

Associates: Alice Johnson, M.D. (Temple, 1978); Jeffrey R. Medoff, M.D. (New York Med. Coll., 1977).

DIVISION OF GENERAL INTERNAL MEDICINE

Professor: Patrick A. McKee, M.D. (Oklahoma, 1962); *Chief*.

Associate Professor: Francis A. Neelon, M.D. (Harvard, 1962).

Assistant Professors: J. Trig Brown, M.D. (Washington Univ., 1977); G. Ralph Corey, M.D. (Baylor, 1973); John R. Feussner, M.D. (Vermont, 1973); KhinMae Hla, M.D. (Inst. of Med., Burma, 1971); Eugene Linfors, M.D. (Duke, 1971).

Assistant Medical Research Professors: Larry J. Fretto, M.D. (California at Los Angeles, 1972); Mario Gonzalez-Gronow, Ph.D. (Univ. of Chile, 1970); David L. Straight, Ph.D. (North Carolina at Chapel Hill, 1979); Mary Ellen Switzer, Ph.D. (Illinois, 1973).

Associates: Linda Frazier, M.D. (Mt. Sinai, 1980); Robert T. Harris, M.D. (Emory, 1978); Laura P. Svetkey, M.D. (Harvard, 1979).

DIVISION OF GERIATRICS

Professor: Harvey Jay Cohen, M.D. (SUNY, 1965); *Chief*.

Assistant Professor: Kenneth W. Lyles, M.D. (Med. Coll. of Virginia, 1974).

Associate: Mark Currie, M.D. (Texas at Dallas, 1978).

DIVISION OF HEMATOLOGY-ONCOLOGY

Florence McAlister Professor: Wendell F. Rosse, M.D. (Chicago, 1958); *Cochief (Hematology)*.

Professor: Robert C. Bast, M.D. (Harvard, 1971); *Cochief (Oncology)*.

Professors: Andrew T. Huang, M.D. (Taiwan, 1965); John Laszlo, M.D. (Harvard, 1955); Harold R. Silberman, M.D. (Washington Univ., 1956).

Medical Research Professor: Joseph E. Sokal, M.D. (Yale, 1940).

Associate Professors: Jon P. Gockerman, M.D. (Chicago, 1967); Davor Vugrin, M.D. (Univ. of Zagreb, 1968); J. Brice Weinberg, M.D. (Arkansas, 1969).

Associate Medical Research Professor: W. David Sedwick, Ph.D. (Pennsylvania, 1970).

Assistant Professors: B. Alton Brantley, M.D. (Duke, 1978); Theresa Blumfelder, M.D. (Missouri, 1973); Wayne Brenckman, M.D. (Yale, 1963); Edwin B. Cox, M.D. (Duke, 1971); Jeffrey Crawford, M.D. (Ohio, 1974); Charles S. Greenberg, M.D. (Hahnemann, 1976); Russell Kaufman, M.D. (Ohio, 1973); Roger Kurlander, M.D. (Chicago, 1971); Joseph O. Moore, M.D. (Johns Hopkins, 1970); William P. Peters, M.D. (Columbia, 1978).

Associates: Gary V. Burton, M.D. (Utah, 1978); Bonnie J. Goodwin, M.D. (Dartmouth, 1977); S. Spence McCachren, M.D. (Duke, 1978); George Phillips, M.D. (Duke, 1978); Marilyn J. Telen, M.D. (New York Univ., 1977); G. Richard Vandenbark, M.D. (Ohio, 1978).

DIVISION OF INFECTIOUS DISEASES

Professor: David T. Durack, M.B., B.S. (West Australia, 1969); D. Phil. (Oxford, 1973); *Chief*.

Associate Professors: Charles Ellenbogen, M.D. (Chicago, 1964); Harry A. Gallis, M.D. (Duke, 1967); John D. Hamilton, M.D. (Colorado, 1964).

Assistant Professors: Donald L. Granger, M.D. (Utah, 1972); John R. Perfect, M.D. (Med. Coll. of Ohio, 1975).

Assistant Medical Research Professor: Dena L. Toffaletti, Ph.D. (North Carolina at Chapel Hill, 1977).

DIVISION OF METABOLISM, ENDOCRINOLOGY, AND GENETICS

Professor: Edward W. Holmes, M.D. (Pennsylvania, 1967); *Chief*.

Professor: Harry T. McPherson, M.D. (Duke, 1948).

Associate Professors: Perry J. Blackshear, M.D. (Harvard, 1977); Marc K. Drezner, M.D. (Pittsburgh, 1970); George J. Ellis, M.D. (Harvard, 1963); Jerome M. Feldman, M.D. (Northwestern, 1961); Charles Johnson, M.D. (Howard, 1963).

Assistant Professors: Warner M. Burch, M.D. (Bowman Gray, 1971); Mark N. Feinglos, M.D. (McGill, 1973).

Assistant Medical Research Professor: Bruce Lobaugh, Ph.D. (Pennsylvania State, 1981); Richard Sabina, Ph.D. (Texas A&M, 1979).

Associates: B. Titus Allen, M.D. (Duke, 1966); Susan P. Smith, M.D. (California at San Diego, 1979).

DIVISION OF NEPHROLOGY

Associate Professor: Vincent W. Dennis, M.D. (Georgetown, 1966); *Chief*.

Professors: James R. Clapp, M.D. (North Carolina at Chapel Hill, 1957); J. Caulie Gunnells, M.D. (South Carolina Med. Coll., 1956).

Associate Professors: William W. Stead, M.D. (Duke, 1973); William E. Yarger, M.D. (Baylor, 1963).

Assistant Professors: Peter C. Brazy, M.D. (Washington Univ., 1972); Paul E. Klotman, M.D. (Indiana, 1976); Rex L. Mahnensmith, M.D. (Yale, 1977).

DIVISION OF NEUROLOGY

Professor: Allen D. Roses, M.D. (Pennsylvania, 1967); *Chief*.

Professors: James N. Davis, M.D. (Cornell, 1965); Albert Heyman, M.D. (Maryland, 1940); John B. Pfeiffer, Jr., M.D. (Cornell, 1942); Donald B. Sanders, M.D. (Harvard, 1964).

Associate Professors: E. Wayne Massey, M.D. (Texas at Galveston, 1970); James O. McNamara, M.D. (Michigan, 1968); C. Warren Olanow, M.D. (Toronto, 1965); S. Clifford Schold, M.D. (Arizona, 1973); Ara Tourian, M.D. (Iowa, 1958).

Assistant Professors: Barrie J. Hurwitz, M.B. (Witwatersrand Univ., 1968); J. Scott Luther, M.D. (North Carolina at Chapel Hill, 1976); Marvin Rozeat, M.D. (Duke, 1966); Donald Schmechel, M.D. (Harvard, 1974).

Assistant Medical Research Professor: Margaret Pericak-Vance, Ph.D. (North Carolina at Chapel Hill, 1978).

Associates: Andrew Bragdon, M.D. (Washington Univ., 1977); James M. Gilchrist, M.D. (Loyola, 1979); Janice M. Massey, M.D. (Georgetown, 1978); Cynthia S. Payne, M.D. (Ohio, 1980); Rodney A. Radtke, M.D. (Northwestern, 1980); Cheolsu Shin, M.D. (Alabama, 1977); Teepu Siddique, M.D. (Dow Med. Coll., 1973); Leslie B. Williams, M.D. (Emory, 1978).

DIVISION OF RHEUMATOLOGY AND IMMUNOLOGY

Frederic M. Hanes Professor: Ralph Snyderman, M.D. (State Univ. of New York, Downstate Med. Ctr., 1965); *Chief*.

Professor: Nicholas M. Kredich, M.D. (Michigan, 1962).

Associate Professors: Barton E. Haynes, M.D. (Baylor, 1973); Michael S. Hershfield, M.D. (Pennsylvania, 1967); David S. Pisetsky, M.D. (Albert Einstein, 1973).

Assistant Professors: Nancy B. Allen, M.D. (Tufts, 1978); David S. Caldwell, M.D. (Bowman Gray, 1967); Richard P. Polisson, M.D. (Duke, 1976); John R. Rice, M.D. (Miami, 1968).

Assistant Medical Research Professors: George Cianciolo, Ph.D. (Miami, 1977); Thomas J. Palker, Ph.D. (Connecticut, 1982); Kay H. Singer, Ph.D. (Duke, 1977).

Associate: Deborah C. German, M.D. (Harvard, 1976).

ADJUNCT FACULTY

Professors of Experimental Medicine: Pedro Cuatrecasas, M.D. (Washington, 1962); Robert A. Maxwell, Ph.D. (Princeton, 1954); Charles A. Nichol, Ph.D. (Wisconsin, 1949).

Associate Professors of Experimental Medicine: David W. Barry, M.D. (Yale, 1969); S. Duk Lee, Ph.D. (Maryland, 1961).

Assistant Professors: Richard DiAugustine, Ph.D. (Tulane, 1968); Thomas E. Eling, Ph.D. (Alabama, 1968); Gary E. R. Hook, Ph.D. (Victoria, 1968); Richard Kent, M.D. (California at San Diego, 1975); Jo Ellen H. Lewtas, Ph.D. (North Carolina State Univ., 1973); Thomas L. Wenger, M.D. (Boston, 1971).

Assistant Professor of Experimental Medicine: John J. O'Neil, Ph.D. (California at San Francisco, 1974).

CLINICAL FACULTY

Clinical Professors: Robert A. Gutman, M.D. (Florida, 1962), Durham, N.C.; John R. Haserick, M.D. (Minnesota, 1941) Pinehurst, N.C.

Associate Clinical Professors: Robert S. Gilgor, M.D. (Pennsylvania, 1962), Chapel Hill, N.C.; Harold L. Godwin, M.D. (Harvard, 1947), Fayetteville, N.C.

Assistant Clinical Professors: Syed Ahmed, M.D. (Dow Med. Coll., 1967), Danville, Va.; Walter E. Davis, M.D. (Duke, 1966), Durham, N.C.; Lewis D. Elliston, M.D. (Baylor, 1969), Asheville, N.C.; Albino Gomez-Uria, M.D. (Madrid Sch. of Med., 1962), Asheville, N.C.; Gloria F. Graham, M.D. (Bowman Gray, 1961), Wilson, N.C.; Michael C. Hindman, M.D. (Illinois, 1973), Durham, N.C.; H. LeRoy Izlar, M.D. (Duke, 1948), Durham, N.C.; John T. Joyner, M.D. (Bowman Gray, 1962), Asheville, N.C.; Elizabeth Kanof, M.D. (New York Univ., 1960), Raleigh, N.C.; James R. Kelly, M.D. (Duke, 1970), Durham, N.C.; Thomas J. Maley, M.D. (New Jersey, 1970), Asheville, N.C.; Lambert O. McLaurin, M.D. (Florida, 1967), Chapel Hill, N.C.;

D. Edmond Miller, M.D. (Duke, 1956), Durham, N.C.; Frank S. Pancotto, M.D. (Chicago, 1975), Concord, N.C.; Jesse Roberts, M.D. (Louisiana, 1961), Winston-Salem, N.C.; Mehrdad M. Sahba, M.D. (Isfahan Faculty of Med., Iran, 1957), Durham, N.C.; John B. Simpson, M.D. (Duke, 1973), Woodside, Cal.; Abe Walston, M.D. (Duke, 1963), Durham, N.C.; Khye Weng Ng, M.D. (Univ. of Malaya, 1956), Durham, N.C.; Edward S. Williams, M.D. (North Carolina at Chapel Hill, 1954), Durham, N.C.; James O. Wynn, M.D. (Cornell, 1951), Chapel Hill, N.C.

Clinical Associates: Woodrow S. Abernathy, M.D. (Columbia, 1969), Durham, N.C.; Franc A. Barada, M.D. (Virginia, 1971), Durham, N.C.; Garrett Bressler, M.D. (Duke, 1978), Durham, N.C.; Robert A. Buchanan, M.D. (Bowman Gray, 1969), Durham, N.C.; Alexander Chiaromonti, M.D. (Michigan, 1976), Cary, N.C.; George W. Crane, M.D. (Northwestern, 1946), Durham, N.C.; Walter C. Fitzgerald, M.D. (Virginia, 1943), Danville, Va.; Ann Lansing, M.D. (Duke, 1981), Asheville, N.C.; Stanley Levy, M.D. (Georgetown, 1971), Durham, N.C.; Emmett S. Lupton, M.D. (New York Univ., 1938), Greensboro, N.C.; Stuart H. Manning, M.D. (Duke, 1976), Durham, N.C.; Patricia M. Mauro, M.D. (Cornell, 1977), Durham, N.C.; W. Stacy Miller, M.D. (North Carolina at Chapel Hill, 1961), Raleigh, N.C.; Jack G. Robbins, M.D. (Duke, 1948), Durham, N.C.; Manfred Rothstein, M.D. (Duke, 1974), Fayetteville, N.C.; Nancy Schecter, M.D. (Duke, 1979), Raleigh, N.C.; Michael B. Shipley, M.D. (Duke, 1974), Durham, N.C.; William V. Singletary, M.D. (Duke, 1943), Durham, N.C.; William V. Singletary, Jr., M.D. (Duke, 1975), Durham, N.C.; Robert B. Stewart, M.D., (West Virginia, 1974), Durham, N.C.; Raymond J. Toher, M.D., (Duke, 1974), Durham, N.C.; William F. Uthe, M.D., (Med. Coll. of Ohio, 1974), Durham, N.C.; Ann Elise Weinrich, M.D., (Med. Univ. of South Carolina, 1978), Durham, N.C.; William J. Wysor, M.D. (Virginia, 1950), Chapel Hill, N.C.

Emeriti: J. Lamar Callaway, M.D.; A. Derwin Cooper, M.D.; James P. Hendrix, M.D.; Walter Kempner, M.D.; Grace P. Kerby, M.D.; Edward S. Orgain, M.D.; Ernst Peschel, M.D.; Ruth L. Peschel, M.D.; R. Wayne Rundles, M.D.; Eugene A. Stead, Jr., M.D.

Required Courses

The Department of Medicine traditionally has the responsibility of preparing students for a lifetime of learning that will occur as they continue to give care to patients who ask them for help. The first step in this process is to acquire the skills and knowledge necessary to learning how to think and act like a physician.

MED-204. Introduction to Clinical Methods: This course occurs over a six week period in late summer following the completion of the first year basic science curriculum. It is a short but intensive course designed to provide the student with the necessary skills and knowledge basic to functioning in a clinical environment. The three major areas that are covered include: (1) history, physical examination, problem formulation; (2) laboratory diagnosis, and (3) radiology diagnosis. In each of these three areas, didactic materials are presented in a morning lecture format and are complemented by afternoon sessions in smaller groups with "hands on" experience. The Interterm also includes a brief introduction to the topic of human sexuality.

The first part of the course includes a series of lectures concentrating on various organ systems and outlining the salient historical features of normality and disease as well as the physical examination features pertinent to the organ system. Two afternoons each week, the students break up into small groups (four to five students) and, interacting with one instructor, interview, examine, present, and write up patients from the wards at Duke Hospital and the VA Hospital. During these patient oriented sessions, skills and techniques necessary for history taking, physical examination, bedside presentations, problem formulation, and writing up findings are introduced and practiced.

The purpose of the laboratory diagnosis portion of the course is to teach the concepts and technical skills necessary for the use of the laboratory in evaluating and managing patients. The course consists of a series of morning lectures and afternoon laboratory sessions stressing the intelligent use of the laboratory in clinical medicine and presented in a disease-oriented format. The lectures summarize difficult topics not easily gleaned from reading the background materials or handouts. The laboratory sessions are designed to serve two purposes: to allow acquisition of the basic psychomotor laboratory skills needed routinely in clinical medicine, such as venipuncture, cell counting, performance of ECGs and microscopic examination of urine and blood; and to provide an opportunity for small instructor-led groups to discuss the

basis of particular laboratory tests and to the application of actual laboratory data to clinical practice.

The aim of the radiology diagnosis portion of the course is to introduce students to the radiographic appearances of common diseases that they will encounter during their clinical years. The principles rather than the details of radiographic interpretation are stressed in a series of lectures and laboratories sessions. In general, two lectures are devoted to each subspecialty area, e.g., chest radiology and neuroradiology, and these are usually scheduled to coincide with the corresponding lectures in physical and laboratory diagnosis. The laboratories are given to groups of fifteen to twenty students, and involve discussion of radiographs at the viewbox. The labs are generally designed to amplify and extend the content of the lecture material. The emphasis is on an informal discussion with considerable interaction of teacher and students. Most of the course material is related to the analysis of radiographs from the basic areas of radiology (chest, bone, gastrointestinal, urologic, and pediatric); with less emphasis on the more specialized areas (neuro, vascular, ultrasound, computed tomography, and nuclear medicine). Students will be expected to develop an understanding of how to analyze the common basic radiographic abnormalities that they will see during their second year in clinical clerkships. The limited introduction to the more specialized areas provides information as to how the new imaging modalities should be applied in the diagnostic investigation of patients.

The human sexuality portion of the course provides a didactic introduction to the psychological and physiologic aspects of sexual response and sexual dysfunction that are commonly encountered in clinical practice. The effects of medical illness and various medications on sexual function and dysfunction are also reviewed to some degree, with additional information available in the form of handouts and reference lists. The treatment of sexual dysfunction, with emphasis on behavioral methods, along with other approaches to marital and sexual dysfunction are also discussed.

At the end of the Interterm, the students are tested via a written examination in radiology, a practical examination in laboratory medicine and both a written and oral practical examination in various aspects of the history, physical examination, and formulation of data into problem lists. Also contributing significantly to the final evaluation is individual student performance during the afternoon ward and laboratory sessions.

MED-205. Medicine. The second year course in medicine is aimed at providing the student with the basic tools used in the practice of medicine. This is the time when he or she should consolidate the material learned during the first year and apply it to the study of his or her own patients. During a brief eight-week course it is not possible to cover systematically the entire body of knowledge of internal medicine; instead, the student is provided a series of representative learning experiences based on the case study method. Our goals are to teach a method of approach to the patient and to provide a firm foundation for the solution of new medical problems as they are encountered in the months and years ahead. Specific expectations of the sophomore student are: (1) The student will perform and record a history and physical examination on each patient he or she admits. The first two weeks on the rotation the student will admit two patients per week; thereafter he or she will admit three patients per week. (2) The student will perform an independent history and physical examination on the patient. After the resident has completed the patient assessment, the student should present to the resident. They should then go back to the bedside to check any discrepancies in either the historical or physical examination findings. The resident will review the workup and discuss the presentation of the patient with the student on the night of admission or at a time before formal patient presentation. (3) A complete work-up will also include an analysis of the peripheral blood smear and urine sediment on all patients. (4) The student should prepare for case presentations by

reading the relevant section in one of the standard textbooks of medicine. (5) The student's complete workup should be in the chart within twenty-four hours of admission and should be in the format provided. (6) The student should take responsibility for patients as the primary care person and is expected to follow his or her patients daily and include progress notes on the chart. He or she is responsible for knowing what therapeutic interventions and/or diagnostic tests have been performed and the outcome of these maneuvers. (7) The student is encouraged to participate in all diagnostic procedures, such as lumbar punctures or thoracenteses, on his or her patients. Where appropriate, the student will perform these procedures under the supervision of the house staff. (8) Daily work rounds with the house staff are mandatory and the student is expected to be sufficiently knowledgeable to participate in patient care decisions. Attending rounds cannot be missed without the prior permission of the attending physician. (9) The student is expected to present patients to attendings within twenty-four hours after admission and to know rationale for patient workup as well as pertinent specific medical information. (10) There will be an oral examination for all second year students during the final week of the rotation. The student will be expected to demonstrate skills in taking histories and performing physical examinations. (11) Students should attend all conference (noon, chief resident's, etc.) unless ward duties preclude.

Electives

MED-210(C). Advanced General Medicine: Duke/VA. Course Goals: To expand the experience and knowledge gained during the second year medicine clerkship by: (1) Primary—Providing additional experience in the management of hospitalized patients with a wide variety of general internal medical problems. (2) Secondary—Developing a comprehensive understanding of the pathophysiology of the common problems encountered on an internal medicine inpatient service. How Goals Will Be Achieved: Students will be assigned to one of the general medical wards at either Duke or the VA Hospital. They will be assigned patients in rotation with the second-year students on the service and will be expected to perform and complete an initial evaluation, develop a care plan, write the orders (to be countersigned by the intern), present the patient at teaching rounds and follow the patient throughout the hospital course. Students will be assigned approximately three patients per week and will be expected to do outside reading on each. The student may be advanced to the sub-internship level during the eight-week period on the recommendation of the chief medical resident. Methods of Evaluation of Student Performance: Students will be evaluated by their intern, resident, and senior staff attending. The evaluation form will be made available to each student at the beginning of the rotation. No final exam is given. Weight: 8. *Greenfield and staff*

MED-211(C). Internal Medicine Subinternship: Duke/VA. Course Goals: To provide an internal medicine patient care experience at the intern level. This course is primarily recommended for the individual who performed at honors level in the second year internal medicine and who either had a prolonged period of time since that experience or is planning an internship in an area other than internal medicine. How Goals Will Be Achieved: Students will be assigned to one of the two inpatient services at either Duke or the VA Hospitals supervised by a third year internal medicine resident. The student will function as an intern on that service with the exception that orders must be countersigned by a medical house officer. No other medical intern will be assigned to those patients handled by the subintern. The number of patients assigned will be determined by the supervising resident with anticipated increases during the four week period. Methods of Evaluation of Student Performance: Students will be evaluated by their resident and senior staff attending. The evaluation form will be made available to each student at the beginning of the

rotation. No final exam is given. Prerequisite: available only to Duke medical students who receive honors in MED-205 or by special permission. Weight: 4. *Greenfield and staff*

MED-212(C). Tutorial in General Internal Medicine. Course goals: (1) Primary—an expanded exposure to general internal medicine. (2) Secondary—to focus and develop physician-patient interactive skills using private in- and outpatients. How Goals Will Be Achieved: Students will work in a one-to-one relationship with one of the faculty members of the Division of General Internal Medicine involved in the daily care of patient activities. Activities will include working up and developing plans of evaluation and therapy as well as presenting inpatients and outpatients in the Medical PDC. The eight-week course differs from the four-week course only in offering an expanded opportunity for exposure to general internal medicine problems. Methods of Evaluation of Student's Performance: The preceptor will observe the student's interaction with patients and the quality of the work-ups including the follow-up care plans and their implications. Prerequisites: approval of the student's choice of preceptor. Weight: 4. *McKee, Brown, Corey, Feussner, Fraizer, Harris, Linfors, Neelon*

MED-213(C). Advanced General Medicine in the Community. Course Goals: (1) Primary—to expand student understanding of adult medicine and primary care in a community setting. (2) Secondary—to improve patient-physician interactive skills. How Goals Will Be Achieved: Under the supervision of the chief medical resident at Durham County General Hospital and the staff at Lincoln Health Center, the student will assume responsibility for the care of four to six inpatients at Durham County General Hospital, and some outpatients at the Lincoln Health Center. Teaching input will come from the Department of Medicine (Duke) and the physicians whose patients are admitted to DCGH. Approximately one-third of time will be spent seeing outpatients at the Lincoln Health Center under attending supervision. Methods of Evaluation of Student Performance: close observation of history, physical examination skills, and write-ups, progress notes, and performance at teaching rounds. Weight: 8. *Harris and Linfors*

MED-220(C). Emergency Room. Course Goals: (1) Primary—provide a broad exposure to clinical problems encountered in the emergency room (or acutely in a private office) such that patients are seen before any other physician contact and students can make diagnoses and plan short-term work-ups. (2) Secondary—gain in ability to rapidly obtain history; shortening of time required to do accurate physical examination; enhancement of dexterity in performing minimally invasive procedures. How Goals Will Be Achieved: Each student works in conjunction with one team of residents and together they are on twenty-four hours/off twenty-four hours, the student then on twelve/off thirty-six (sleep in every fourth night; about seventy hours per week). While collaborating with the medical resident, s(he) will be involved in diagnostic procedures and interpretation of material obtained before planning management of illness. This allows the students to test their ability to make diagnoses and plan subsequent acute studies. Didactic sessions, held twice weekly, cover clinical topics relative to emergency medicine. Methods of Evaluation of Student Performance: is based upon the gain in ability to rapidly do the history/physical examination; evidence of increased dexterity in minimally invasive procedures; and demonstrated increase in knowledge plus the skill to interpret present studies. Prerequisites: none are mandatory; prior experience in other electives will be beneficial. Weight: 4 or 8 (course can be full time for four or eight weeks and the real differences are duration of exposure to acute care medicine; time to hone skills in making diagnoses; to become more proficient with one's hands; and opportunity to work with twice as many residents.) *Silberman*

MED-223(C). Intensive Care Medicine, Duke. Course Goals: (1) Primary—to introduce the student to a pathophysiologic approach to critically ill adults. (2) Secondary—to provide an opportunity for students to perform selected procedures. How Goals Will Be Achieved: Students will perform as subinterns in a very active intensive care unit. Patient evaluations, procedures, diagnostic planning and treatment planning are performed by students under the direct supervision of the junior assistant resident, pulmonary fellow, and attending physician. Night call occurs every other or every third night. Regular didactic lectures on topics related to the diagnosis and treatment of the critically ill will be given by the attending staff. The physiological and biochemical approach to critical care medicine is stressed. Emphasis is placed on access to attending physicians and pulmonary fellows for the discussion of specific patient-oriented questions. Preferences for the month of rotation will be honored if possible. Questions should be directed to Dr. Davies, 681-5850. Methods of Evaluation of Student Performance: each student's performance is assessed by the unit director through direct observation of the student in the clinical and didactic environments. Input from the residents, fellows, and other attending physicians is also obtained. Weight: 4. *Fulkerson and pulmonary staff*

MED-224(C). Intensive Care Medicine, VA Hospital. Course Goals: (1) Primary—to provide experience in applying physiologic and pharmacologic principles to the care of critically ill adults. (2) Secondary—to provide an atmosphere for the development of skill in diagnostic procedures. How Goals Will Be Achieved: Students will rotate on every third night call schedule for the duration of this four-week course. Under the supervision of junior assistant residents and a pulmonary fellow, the student will function as a junior intern and will be responsible for patient work-ups and daily bedside presentations. Students will be given responsibilities for procedures and decision making commensurate with their abilities. Daily attending rounds stress a physiologic approach to the management of critically ill patients. Each student will be provided with a syllabus of selected readings which will supplement regular didactic sessions on diagnoses, pathophysiology, and management of critical illness. Students may obtain information by telephoning 286-0411, ext. 6195, and should arrange for a replacement if they subsequently drop the course. Methods of Evaluation of Student Performance: evaluations are done by the fellows and faculty attending on the MICU and are based on observed performance. Weight: 4. *Young*

MED-231(C). Clinical Allergy-Immunology. Course Goals: (1) Primary—familiarization of the student with the clinical uses of the allergy-immunology laboratory. (2) Secondary—precepted instruction in the logical use of clinical and basic laboratory information in patient care. How Goals Will Be Achieved: The consultative role of the allergy-immunology laboratory is used as a focus to gain a critical awareness of the clinical utility and pitfalls of immunoserologic information. During the first several weeks the student will clinically evaluate selected patients with impaired immunity (impaired resistance to infection, hypersensitivity, auto-immunity, neoplasia, or other immunologic problems) from the clinic and/or consultative service. The student will have an opportunity to participate in the immunoserologic studies applicable to assigned patients. This experience is used to identify a mutually acceptable topic for selected readings and weekly discussions of either a laboratory procedure or immunologic alterations associated with an immune disease. These readings and discussions provide the substantive basis for a required technical report. The content of this short critical summary of current knowledge is focused on the utility of either a specific laboratory procedure or the value of laboratory studies in the care of patients with a specific immune disease. Methods of Evaluation of Student Performance: the student's understanding of and ability to use the information gained in the care of the patients and the content of the technical report are used to evaluate performance. Prerequisite: approval of the course director. Weight: 8. *Buckley*

MED-240(C). Clinical Cardiology. Course Goals: (1) Primary—to develop proficiency in obtaining and understanding the cardiovascular bedside examination and interpreting a routine electrocardiogram and chest X-ray. (2) Secondary—to develop an understanding of the pathophysiology of heart disease, the use of noninvasive (echo, exercise testing, radionuclide studies, and Holter monitoring) and invasive (cardiac catheterization) technologies in patient evaluation, the use of data banking in epidemiologic research and patient management and the role of the cardiovascular consultant in patient evaluation and management. How Goals Will Be Achieved: These goals will be achieved through a core curriculum of didactic lectures and patient and cardiology patient simulator (HARVEY) laboratory sessions occurring from 10 A.M. to 12 noon throughout the eight weeks, as well as through participation in two four-week experiences: a clinical evaluation subrotation, and an inpatient cardiology subrotation. During the clinical evaluation subrotation, the student will be assigned to either Duke or the VA and will be responsible for interpreting electrocardiograms, performing cardiology consultations, and evaluating patients in preparation for cardiac catheterization. During the other four-week experience, the students will be assigned to either Duke, VA, or DCG Coronary Care Unit, or to a private attending cardiologist as a subintern. On the CCU, the student will work in close cooperation with house staff and in the evaluation and management of patients with acute cardiovascular illnesses. As a subintern, the student will be responsible for evaluation and management of patients in concert with the intern, fellow, and senior staff physician. Students wishing to drop this elective must do so at least two weeks prior to the starting date. Subsequently, no drop will be permitted unless the student identifies an alternate for that slot. Methods of Evaluation of Student Performance: students will be evaluated by all resident and senior staff with whom they work, and the evaluation questionnaire will be made available to the student at the beginning of the clerkship. At the end of the course, students will be objectively evaluated by a written test and by a practical examination on the cardiology patient simulator. Weight: 8. *Waugh and cardiology staff*

MED-241(C). Preventive Cardiology: Clinical Applications. Course Goals: (1) Primary—to teach students the clinical applications of newer knowledge of preventive cardiology. (2) Secondary—to teach students how to assess their own cardiovascular risk status and means for its modification. How Goals Will Be Achieved: The course is given once every eight weeks and is organized around weekly didactic sessions and discussions of clinical cases. In addition, problem sets and a comprehensive reading list augment the classroom session. Several members of Duke faculty as well as outside speakers from different clinical disciplines participate in the course. Some of the topics discussed include “risk factor” modification (such as clinical management of hyperlipidemia and hypertension, behavior modification, and smoking); secondary prevention by early diagnosis of coronary artery disease (CAD) using new technologies; tertiary prevention by maximum rehabilitation. Such issues as the pros and cons of surgical vs. medical approaches to CAD are examined not only in terms of scientific knowledge but also in economic terms. Methods of Evaluation of Student Performance: (1) quality of the student’s classroom discussions demonstrating the extent of prior reading and (2) an examination. Weight: 1. *Kimm and guest speakers*

MED-242(C). Clinical Arrhythmia Service. Course goals: (1) Primary—to provide students with an in-depth exposure to the diagnosis and management of cardiac arrhythmias, electrophysiologic studies, and cardiac pacemakers. This course is not designed to be a substitute for the general cardiology elective (240C). (2) Secondary—to familiarize the student with certain basic techniques of arrhythmia diagnosis such as esophageal recording and pacing. How goals will be achieved: the student will spend four weeks working on the clinical arrhythmia service under the direct supervision of either Dr. Lawrence German or Dr. Marcel Gilbert. The student will

make rounds with the clinical electrophysiology service on inpatients with arrhythmia problems. The student will attend electrophysiologic studies and assist in the analysis of data from these studies. The student will be responsible for the work-up of patients admitted to the arrhythmia service as well as inpatient consults, and will play an important role in the followup of these patients while they are in the hospital. The student will also see outpatients during arrhythmia clinic that meets Wednesday afternoons in the PDC. The student will assist in the evaluation of patients for permanent pacemaker implantations. Students will be responsible for reviewing the literature on subjects related to the patients that they have seen on the clinical service. Methods of evaluation of student performance: Students will be evaluated on their clinical skills in taking histories, performing physical examinations, as well as in their presentation and assessment of the patient's problem. They will also be assessed on their ability to read and understand the relevant literature, and they will be assessed on their ability to assume a responsible role in the operation of the clinical arrhythmia service. Weight 4. *German and Gilbert*

MED-250(C). Clinical Dermatology. Course Goals: (1) Primary—to become familiar with the pathophysiology and clinical assessment and management of common outpatient dermatological problems. (2) Secondary—to become cognizant of the appropriate dermatological evaluation and treatment of hospitalized patients and those with unusual or rare skin disorders. How goals Will Be Achieved: Students will be integrated into the dermatology program for one month. They will attend public and private outpatient clinics at the Duke Medical Center and the VA Hospital. They will participate in inpatient teaching rounds, the clinical diagnostic conference, pathology conference, and basic science seminars. Time will be allotted for viewing dermatological teaching tapes as well. Methods of Evaluation of Student Performance: dermatology attendings at Duke and the VA Hospitals will assess the students' motivation and dermatologic diagnostic skills. Weight: 4. *Dermatology staff*

MED-251(C). Lectures and Demonstration in Clinical Dermatology. Course Goals: The primary goal is to become familiar with the clinical presentation and pathophysiology of dermatological disorders and their management and treatment. How Goals Will Be Achieved: The course will be presented over an eight week period with three lectures weekly, using 35mm. Kodachromes. Clinical assessment will be emphasized by presentation of patients with common, as well as unusual, skin disorders one half day per week. Methods of Evaluation of Student Performance: As this is a lecture and demonstration course only, a test given at the end of the course will be used to assess knowledge gained. Weight: 2. *Dermatology staff*

MED-260(C). Gastroenterology. Course Goals: (1) Primary—to provide experience with digestive diseases from which the student can develop a sufficient base of information on the fundamental approach and management of these problems to enable scholarly growth from subsequent experience. (2) Secondary—to provide an environment which will stimulate questions concerning digestive diseases and attract students with a research interest into the field. How Goals Will Be Achieved: Participation in the care (work-up and management) of at least five patients each week hospitalized on the general wards of Duke or VA Hospitals or on the gastroenterology unit at Duke North under the guidance of the AR and fellowship staff and under the direction of faculty members assigned either to the VA Consultation Service, Duke North Inpatient Service, or Duke North Private and Public Patient Consultation Services. The students' experience may include direct participation in the activities of the clinical laboratory of the Division of Gastroenterology which offers over thirty-five specialized tests and/or procedures necessary for the state of the art care of patients with digestive diseases; for example, biochemical tests include measurements of gastric secretion and analysis of trypsin, procedural activities range from upper

endoscopy and endoscopic retrograde cholangiopancreatography to endoscopic colon polypectomy and endoscopic ampulla of Vater papillotomy. Morphologic and physiologic data derived from these and other laboratory studies are discussed in the context of specific patient problems in several weekly rounding and conference settings. Students have an opportunity to interact with all the faculty of the Division at morning rounds and other conferences where patients from all of these services (Duke and VA) are discussed. Rounds on patients with liver disease are held separately twice weekly with participation by students on all services. Methods of Evaluation of Student Performance: Student evaluation forms are completed by the AR, fellows and faculty participating with the student on individual patient care services. Final evaluation represents a composite of these forms which chiefly identify performance of clinical skills, fund of basic information, organizational ability, and degree of interest and participation. Weight: 4. *Tyor and gastroenterology staff*

MED-261(C). Rational Basis for Practice of Gastroenterology. Course Goals: (1) Primary—to explore mechanisms leading to symptoms and disease of the gastrointestinal tract, including those whose origin is immunological, biochemical, infectious, and neural. (2) Secondary—to provide a sufficient fund of information on digestive diseases to enable informed care of patients and an appreciation of clinical and basic areas that need scholarly investigation. How Goals Will Be Achieved: Through a series of twice weekly lectures followed by questions and answer sessions, key digestive diseases found commonly in any practice of internal medicine will be explored over an eight week period from the standpoint of their etiology, diagnoses, and management. Examples include: gastrointestinal hormones and peptic ulcer disease; approach to the patient with GI bleeding; infections of the gut; viral hepatitis, both acute and chronic active; portal hypertension/portal-systemic encephalopathy; and approach to the patient with abdominal pain. With the faculty at both Duke and VA participating, the student has the opportunity to interact with all of the senior members of the Gastroenterology Division. Sessions are general held from 4 to 6 P.M. on Mondays and Wednesdays. Methods of Evaluation of Student Performance: Student evaluation is based upon (1) the interest and inquisitiveness shown during the teaching sessions; (2) a written test to determine the degree to which students have learned key concepts in digestive diseases. Weight: 2. *Tyor and gastroenterology staff*

MED-270(C). Outpatient Hematology-Oncology (Duke). Course Goals: The primary goal is to give the student experience in the diagnosis, long-term treatment, and supportive care of patients with hematologic and oncologic disorders in the outpatient setting. How Goals Will Be Achieved: On one half day each week the student will see and take part in the care of patients with these disorders under the supervision of staff personnel. (The course is offered over eight or preferably sixteen weeks.) Methods of Evaluation of Student Performance: Students will be evaluated by their preceptors on the basis of their ability to obtain a history, perform a physical examination, evaluate hematologic and other laboratory data, integrate these data, and propose assessments and plans of action. Weight: 1-2. *Rosse and hematology/oncology staff*

MED-272(C). Clinical Hematology and Oncology (Duke). Course Goals: The primary goal is teaching the diagnosis and treatment of patients with hematologic and oncologic diseases. How Goals Will Be Achieved: Patient contact is stressed in various roles including those as outpatient, inpatient, and consultant physician. The diagnostic techniques used in assessing hematologic and oncologic diseases are stressed and the basic understanding of the pathophysiology of hematologic and oncologic diseases is provided. Two types of experience are offered: (1) the Consult Service in which the student sees the patient in consult on Wards 81-83 and reviews the diagnostic and therapeutic data with a consultant and (2) the Private Inpatient Service

in which the student takes part in the care of the patients of one of the private physicians. Outpatient experience is provided for both types of experience. Four week students may select either experience while those electing an eight week rotation will have both types of experiences. Methods of Evaluation of Student Performance: Students will be evaluated by their preceptors on the basis of their ability to take a history, perform a physical examination, evaluate hematologic and other laboratory data, integrate these data, and propose assessments and plans of action. Weight: 4 or 8. *Rosse and hematology/oncology staff*

MED-273(C). Clinical Hematology and Oncology (VA). Course Goals: The primary goal is teaching the diagnosis and treatment of patients with hematologic and oncologic diseases. How Goals Will Be Achieved: As a member of the section, the student actively participates in the following: (1) hematology-oncology consultation service for the VA wards, (2) hematology-oncology outpatient clinics, (3) management of disorders including leukemias, lymphomas, anemias, bleeding disorders, gammopathies, etc. An opportunity is provided for the student to learn and perform the specialized clinical and laboratory techniques involved in the evaluation of these patients. Ample time is available for contact with the hematology staff and library research. Students electing an eight week experience will function as subinterns for the second four weeks with a commensurate increase in responsibilities and duties in both the inpatient and outpatient arenas. Methods of Evaluation of Student Performance: Students will be evaluated by their preceptors on the basis of their ability to obtain a history, perform a physical examination, evaluate hematologic and other laboratory data, integrate these data, and propose assessments and plans of action. Weight: 4 or 8. *Weinberg and hematology staff*

MED-274(C). Medical Subinternship in Hematology-Oncology. Course Goals: This is an intensive course in the medical care of patients with hematologic and oncologic disorders. How Goals Will Be Achieved: The student will be given considerable responsibility, under supervision, in the care of inpatients either in Duke North or on Jordan Ward. They will receive instruction and experience in diagnostic and therapeutic procedures, the pathophysiology of the diseases in question, and the use of drugs and their interactions and the interactions of patients and their families. Methods of Evaluation of Student Performance: Students will be evaluated by their preceptors on the basis of their ability to obtain a history, perform a physical examination, evaluate hematologic and other laboratory data, integrate these data, and propose assessments and plans of action. Prerequisite: approval of faculty based on prior performance. Weight: 4. *Rosse and hematology/oncology staff*

MED-280(C).^{*} Clinical Infectious Diseases. Course Goals: To provide experience in the clinical and laboratory diagnoses of infectious diseases and in their therapy. The primary emphasis will be placed on learning from interaction with patients, resident staff and faculty on the consultation service. Students are expected to work up assigned patients by interviews, physical examination, and collation of laboratory results, leading to a summary and synthesis of the problem. Particular emphasis will be placed on close follow-up of the patients during hospitalization, including attendance at procedures or operations whenever possible. They should know their own patients well enough to be able to give a reasonable presentation on ward rounds or at conferences without notice. Students will be expected to read in-depth standard texts about their patients' problems, including a few recent relevant primary references. Students are expected to attend punctually the various conferences listed on the weekly schedule of division activities, including microbiology plate rounds, Journal Club, and tutorials. They will be asked to present cases and provide some discussion at the Thursday VA conference, and to present cases as requested by Dr. Osterhout at his teaching conferences (MIC-339B). Each student

should be prepared to present and briefly discuss one article that he or she considers to be interesting and timely at Journal Club. (Adds will be accepted at any time providing the course has not been filled. Drops will not be accepted within thirty days of the first day of classes unless the student finds a replacement.) Methods of Evaluation of Student Performance: Each student's performance will be evaluated and graded by the resident, fellow, attending, and Dr. Osterhout, using the usual "honors," "pass plus," "pass," "deferred," or "unsatisfactory" system. In arriving at a consensus, appropriate emphasis will be placed on knowledge, enthusiasm, and evidence of improvement during the rotation. There will be no written examination. No other courses are to be taken in conjunction with MED-280(C). Weight: 4. *Durack and infectious disease staff*

MED-290(C). Metabolism and Endocrinology. Course Goals: (1) Primary—this course is designed to provide the student an in-depth experience in evaluation and management of patients with endocrine disorders. (2) Secondary—basic clinical skills will be supplemented with an in-depth experience in hormone physiology. The student will have the opportunity to explore through reading and conferences the mechanism of hormone action and physiologic consequences of hormone interaction with target tissues. How Goals Will Be Achieved: Students will be introduced to patient problems through working with one of the preceptors in this course—Drs. McPherson, Feinglos, Ellis, and Johnson. In addition, the students will be introduced to patient problems through outpatient clinics specializing in endocrine problems, staff consultation rounds, and weekly endocrine grand rounds. The inpatient and outpatient contacts will provide the student the opportunity for evaluation and management of endocrine problems. The consultation rounds and weekly conference will serve as the focus for discussions on basic mechanisms of hormone action. Methods of Evaluation of Student Performance: A written critique will be provided by the student's preceptor and comments will be sought from other members of the division. Weight: 4. *Holmes and endocrinology staff*

MED-291(C). Diabetes Mellitus: A Camping Experience. Course Goals: To provide the student with the opportunity to evaluate and manage young patients with diabetes in an outpatient, nonhospital setting. How Goals Will Be Achieved: In June and August of each year, Eagles Nest Camp for children with diabetes provides a two week camping experience for over 125 children annually. Medical support is provided by medical, nursing, and physician associate students and diabetic interns, under University staff supervision. Each student is directly responsible for the management of one cabin of campers. The student participates in infirmary duty, prepares one of the daily staff seminars, and joins in general camp activities. Room and board are provided. Methods of Evaluation of Student Performance: Students will be evaluated by Dr. Ellis and other University faculty members on the staff at Eagles Nest Camp. Prerequisite: applicants must interview with Dr. Ellis prior to acceptance. Weight: 2. *Ellis*

MED-292(C). A Subinternship on the Diabetes Care and Management Service. Course Goals: (1) Primary—to provide the student with an in-depth experience in the management of patients with diabetes mellitus. (2) Secondary—to provide the student with an appreciation of the pathophysiology of the numerous complications of diabetes mellitus. How Goals Will Be Achieved: The student will be directly responsible for the management of inpatients admitted to the Diabetes Care and Management Service at the Duke University Eye Center. The student will perform a history and physical examination on all patients admitted to the service, write all orders, and take charge of day-to-day management of diabetes and other medical problems of these patients. Rounds will be conducted each day with a member of the senior staff on the Endocrine Division. In addition to supervision by the staff in endocri-

nology, the student will be exposed to the ophthalmology staff and have an excellent opportunity to observe and read in depth on the ophthalmologic complications of diabetes mellitus. Methods of Evaluation of Student Performance: Senior staff members participating in this service will evaluate the student with standard Department of Medicine intern evaluation forms. Weight: 4. *Holmes and endocrinology staff*

MED-300(C). Nephrology. Course Goals: (1) Primary—to provide clinical experience in the diagnosis, assessment, and treatment of renal diseases and hypertension. (2) Secondary—to integrate renal physiology, immunology, pathology, and biochemistry into the clinical assessment of patients presenting with fluid and electrolytes disorders, problem hypertension, acute renal failure, end-stage renal disease and related complications. The student rounds daily with a renal fellow or senior resident, attends twice weekly faculty teaching rounds and attends regularly scheduled conferences devoted to correlations with basic science, review of renal biopsy material, transplantation, etc. Special emphasis is placed on renal physiology and pathophysiology, renal histopathology, and hypertension. Students may elect to participate at the VA Hospital or on the private or nonprivate services at Duke. Methods of Evaluation of Student Performance: written comments from the faculty. Weight: 4. *Mahnensmith and the nephrology staff*

MED-301(C). Physiology of Nephrology. Course Goals: (1) Primary—to provide an applied approach to the management of fluid and electrolyte problems encountered in clinical medicine. To do this, cases are presented as problem-solving examples. The goal of these cases is to develop a systematic approach to the analysis of specific electrolyte derangements and to the correct selection of appropriate intravenous replacement therapy. These case studies are interwoven with a series of lectures designed to review specific areas such as compartmentalization of body fluids, derangements in acid-base balance, diuretic selection and use, analysis and approach to the treatment of potassium problems, etc. The ultimate goal is to provide students with sufficient knowledge to systematically analyze the many different derangements which can occur in this area and arrive at the proper approach to therapy. (2) Secondary—to integrate basic renal physiology with clinical problems of fluid and electrolytes metabolism. How Goals Will Be Achieved: classroom experience. Does not involve patient exposure. Method of Evaluation of Student Performance: final exam. Weight: 2. *Dennis and nephrology staff*

MED-310(C). Neurology Clerkship Course Goals: (1) Primary—to train students in the techniques of history, physical examination, and data synthesis in medical neurology, with special emphasis on developing a reliable neurological examination. (2) Secondary—to understand the localization and differential diagnosis of lesions and diseases affecting the nervous system. How Goals Will Be Achieved: Students are assigned to inpatient services at Duke and the VA Hospitals. Each service consists of medical interns, neurology residents, and senior staff. The student is responsible for the complete work-up of at least three new patients per week. All patients are reviewed with the resident and presented to the attending physician during daily rounds. Efficiency and completeness are emphasized. Some patients are presented to the teaching attendings assigned to the Duke and VA Hospital services for formal combined teaching rounds three times weekly. Students attend all major conferences, including neurology-neurosurgery grand rounds, neuropathology rounds, brain cutting conference, medicine clinical conference, and can attend other subspecialty rounds (neuromuscular, stroke, epilepsy, neuro-oncology, and others). Full-time participation is expected. Students electing an eight week experience may participate in either a subinternship or consultation rotation during the second four weeks, depending on performance. Methods of Evaluation of Student Performance: Each member of the

team (residents and staff) submits a written evaluation concerning students' performance. Weight: 4 or 8. *Roses and neurology staff*

MED-320(C). Rheumatic and Immunological Diseases. Course Goals: (1) Primary—to provide the student with experience in the recognition and care of patients with inflammatory disease, immunologic disease, connective tissue disease, and metabolic arthropathies. (2) Secondary—to have the student become acquainted with the specialized laboratory and clinical techniques relating to the evaluation of patients with rheumatic, immunologic, and metabolic disorders affecting connective tissue. Joint aspiration, evaluation of immunological testing, synovial fluid analysis, bone and joint radiology, and histopathological analysis of tissue biopsies will be studied. How Goals Will Be Achieved: Students will evaluate patients at the Duke and Durham VA Hospitals. Daily rounds are held with the faculty where patients are presented and reviewed in detail. Journal clubs precede rounds four times a week. Basic science conferences, bone and joint radiology conferences, pathology conferences and rheumatology/immunology grand rounds are held at regular weekly intervals. A comprehensive approach to the evaluation and treatment of patients with inflammatory, immune deficiency, and certain metabolic disorders is emphasized. Students are assigned primary responsibilities either on the inpatient service or the consultation service at the Duke or Durham VA Hospitals. In addition to their patient responsibilities, students are assigned to ambulatory care clinics and participate in all the scheduled functions of the division. Methods of Evaluation of Student Performance: Students are evaluated based on their patient presentations, their participation in discussions on rounds and in conferences, and their presentation at journal clubs. Prerequisite: No other courses are to be taken in conjunction with Medicine 320(C). Weight: 4. *Snyderman and rheumatology/immunology staff*

MED-321(C). Rheumatology. Course Goals: An introductory course in clinical rheumatology designed to introduce students to the basics of differential diagnosis in the rheumatic diseases and to provide more detailed knowledge of the more common and major groups of rheumatic diseases. How Goals Will Be Achieved: This is primarily a lecture course. Use of patient materials will be limited. Methods of Evaluation of Student Performance: oral examination. Weight: 1. *Rice and invited lecturers*

MED-400(C). Geriatric Medicine. Course Goals: (1) Primary—become familiar with the principles of caring for the geriatric patient. (2) Secondary—become familiar with the physiology and diseases of aging. How Goals Will Be Achieved: This elective is offered by the interdepartmental faculty of the Division of Geriatric Medicine. The student will work with faculty, fellows, and house staff in number of settings involved in the care of the geriatric patient. These will include the Geriatrics Evaluation and Treatment Clinic (Duke), Geriatric Evaluation Unit and Clinic (VA), geriatric consultation services (VA, DCG, Duke), nursing home facilities, interactions with community services (Coordinating Council for Senior Citizens), home assessment, and other. Principles to be stressed will be biology and pathophysiology of aging, multiple clinical problems in the elderly, interdisciplinary team approach to evaluation, planning and treatment; goals of maximal functional achievement and independence for the elderly. The student will participate actively in the work-up and management of patients in both inpatient and outpatient settings as well as become more familiar with the problems of the elderly in the community. Familiarity with the growing literature in geriatric medicine will be encouraged and the student will participate in seminars, lectures, and team meetings at the appropriate sites including the Duke Center for the Study of Aging. Methods of Evaluation of Student Performance: Evaluation will be by consensus of instructors and fellows at the various training sites.

It will be based on discussions and presentations throughout the course period. Prerequisite: approval of course director. Weight: 4. *Cohen and gerontology staff*

MED-410(C). Psychosocial Aspects of Medical Illness. Course Goals: (1) Primary—to provide the student with knowledge of basic principles and practical skills relevant to determining the role of psychosocial factors in the etiology and course of physical disease, as well as the patient's adjustment to illness. (2) Secondary—to help the student improve interviewing and history taking skills necessary to establish an optimum doctor-patient relationship. How Goals Will Be Achieved: Students will tape record one new patient work-up per week which they will go over with the instructor during a supervisory hour. Method of Evaluation of Student Performance: will be based upon improvement in ability to elicit psychosocial data relevant to the present illness. Prerequisite: This course must be taken in conjunction with another course in which the student is directly involved in the evaluation and treatment of nonpsychiatric adult patients. Students should contact Dr. Redford Williams (684-3863) prior to the start of the term to arrange meeting times. Weight: 2. *Williams*

Microbiology and Immunology

James B. Duke Professor: Wolfgang K. Joklik, D. Phil. (Oxford, 1952), *Chairman*.

James B. Duke Professor: D. Bernard Amos, M.D. (Guy's Hospital, London, 1963).

Professors: Robert C. Bast, Jr., M.D. (Harvard, 1971); Dani P. Bolognesi, Ph.D. (Duke, 1967); Rebecca H. Buckley, M.D. (North Carolina at Chapel Hill, 1958); Eugene D. Day, Ph.D. (Delaware, 1952); David T. Durack, D.Phil. (Oxford, 1973); Richard S. Metzgar, Ph.D. (Buffalo, 1959); Suydam Osterhout, M.D. (Duke, 1949), Ph.D. (Rockefeller Inst., 1959); Wendell F. Rosse, M.D. (Chicago, 1958); Hillard F. Seigler, M.D. (North Carolina at Chapel Hill, 1960); Ralph Synderman, M.D. (New York, Downstate Med. Ctr., 1965); Frances E. Ward, Ph.D. (Brown, 1965); Robert W. Wheat, Ph.D. (Washington Univ., 1955); Catherine M. Wilfert, M.D. (Harvard, 1962); Hilda P. Willett, Ph.D. (Duke, 1949).

Visiting Professor: Nicholas C. Palczuk, Ph.D. (Pennsylvania, 1958).

Adjunct Professors: James J. Burchall, Ph.D. (Illinois, 1963); David W. Scott, Ph.D. (Yale, 1969); Norman F. Weatherly, Ph.D. (Kansas, 1962).

Associate Professors: Deepak Bastia, Ph.D. (Chicago, 1971); Ronald B. Corley, Ph.D. (Duke, 1975); Peter Cresswell, Ph.D. (London, 1971); Jeffrey Dawson, Ph.D. (Case Western Reserve, 1969); Sharyn A. Endow, Ph.D. (Yale, 1975); Stanley A. Gall, M.D. (Minnesota, 1962); Gale B. Hill, Ph.D. (Duke, 1966); Jack D. Keene, Ph.D. (Washington, 1974); Dolph Klein, Ph.D. (Rutgers, 1961); Elwood A. Linney, Ph.D. (California at San Diego, 1973); Thomas G. Mitchell, Ph.D. (Tulane, 1971); Harvey J. Sage, Ph.D. (Yale, 1958); Peter Zwadyk, Jr., Ph.D. (Iowa, 1971).

Associate Medical Research Professor: Sara E. Miller, Ph.D. (Georgia, 1972).

Adjunct Associate Professors: John C. Cambier, Ph.D. (Iowa, 1975); Jeffrey J. Collins, Ph.D. (Harvard, 1972); Lorraine Flaherty, Ph.D. (Cornell, 1973); Hillel S. Korean, Ph.D. (Harvard, 1972).

Assistant Professors: Dolph O. Adams, M.D. (Med. Coll. of Georgia, 1965); Yair Argon, Ph.D. (Harvard, 1979); Ralph R. Bollinger, M.D. (Tulane, 1970), Ph.D. (Duke, 1977); Charles E. Buckley III, M.D. (Duke, 1954); Olivera J. Finn, Ph.D. (Stanford, 1980); Harry A. Gallis, M.D. (Duke, 1967); Barton F. Haynes, M.D. (Baylor, 1973); Kenneth N. Kreuzer, Ph.D. (Chicago, 1978); David R. McClay, Jr. (North Carolina at Chapel Hill, 1971); James E. Nidel, Ph.D. (Miami, 1973), Ph.D. (Miami, 1974); Michael C. Ostrowski, Ph.D. (South Carolina, 1979); David J. Pickup, Ph.D. (National Institute of Medical Research, London, 1979); David S. Pisetsky, Ph.D. (Albert Einstein, 1972), M.D. (Albert Einstein, 1973).

Assistant Medical Research Professors: Vickers Burdett, Ph.D. (Georgetown, 1973); Deborah V. Dawson, Ph.D. (North Carolina at Chapel Hill, 1981); W. David Sedwick, Ph.D. (Pennsylvania, 1970); Kay H. Singer, Ph.D. (Duke, 1977); Carol C. Wisnant, Ph.D. (Duke, 1975).

Adjunct Assistant Professor: Lynn P. Elwell, Ph.D. (Oregon, 1974); William J. Hubbard, Ph.D. (Iowa, 1973); Susan F. Radka, Ph.D. (Pittsburgh, 1977).

Medical Research Associates: Andrew E. Balber, Ph.D. (Rockefeller, 1971); Enrique G. Estevez, Ph.D. (Miami, 1976); Lizzie J. Harrell, Ph.D. (North Carolina State, 1978); Donna D. Kostyu, Ph.D. (Duke, 1979); Alan C. Whitmore, Ph.D. (North Carolina at Chapel Hill, 1977).

Lecturer: Alfred P. Sanfilippo, Ph.D. (Duke, 1975), M.D. (Duke, 1976).

Research Associates: J. Alexander, Ph.D.; S. Argov, Ph.D.; D. Armaleo, Ph.D.; A. Banerjee, Ph.D.; J. Blum, Ph.D.; J. Biegel, Ph.D.; C. Boyer, Ph.D.; J. Chambers, Ph.D.; S. Chambers, Ph.D.; R. Chmelo, Ph.D.; R. Drucker, Ph.D.; D. Friele, Ph.D.; R. Gaillard, Ph.D.; L. Hart, M.D.; M. Hollingsworth, Ph.D.; W. Hu, Ph.D.; D. Kelner, Ph.D.; T. Kuhara, Ph.D.; P. Lutz, Ph.D.; D. Mahvi, M.D.; L. Markert, M.D., Ph.D.; K. McKinnon, Ph.D.; J. Moore, Ph.D.; S. Mukherjee, Ph.D.; R. Patel, Ph.D.; E. Patterson, Ph.D.; M. Sirmon, M.D.; T. Sladek, Ph.D.; J. Wiener, Ph.D.

Emeritus: Norman F. Conant, Ph.D.

Required Courses

MIC-200. The core course for all freshman medical students—is given in the second semester of the first year. An intensive study is made of the common bacteria, viruses, fungi, and parasites which cause disease in man. The didactic portion of the course focuses on the nature and biological properties of micro-organisms causing disease, the manner of their multiplication, and their interaction with the entire host as well as specific organs and cells. The role of the immune system and of specific chemotherapy on the host-parasite relationship are included.

The laboratory portion of the course is designed to acquaint students with the methods and procedures employed in bacteriological laboratories, to provide the basis for an understanding of cell-virus interactions and to demonstrate the nature of the more common pathogenic fungi and parasites. Clinical case histories are presented by the clinical staff to correlate this course with patient care.

MIC-201. A short core course in immunology for freshman medical students. The course includes a general introduction to the development of various special areas of immunology such as immunochemistry, immunoematology, and immunogenetics including transplantation and tumor immunology. The initial lectures describe the properties of antibodies, the characteristics of antigens, classes of reactive lymphocytes and accessory cells, the biology of substances released from lymphocytes (lymphokines) and the complement system. The course is enriched with clinical presentations and by discussion groups combined with practical demonstrations.

Electives

MIC-246(B). Seminar on Parasitic Diseases. Topics in the physiology and immunology of major human and animal parasites with an emphasis on protozoa and schistosomes. Extensive reading in and discussion of current literature. Basic parasitology developed in introductory readings and lectures. Weight: 3. *Balber*

MIC-252(B). * General Virology and Viral Oncology. The first half of the course will be devoted to a discussion of the structure and replication of mammalian and bacterial viruses. The second half will deal specifically with tumor viruses, which are discussed in terms of the virus-cell interaction, the relationship of virus infection to neoplasia, and the role of the immunological response to tumor virus infection. The viral oncology part of the course may be taken for half credit in term 4. Permission of the instructors is required. Weight: 4. *Keene, Joklik, Bastia, Kreuzer, Ostrowski, Linney, and Pickup*

MIC-259(B). * Molecular Biology I. Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Weight: 3. *Richardson and staff*

MIC-268(B). * Molecular Biology II. Nucleic Acids. Consideration of structure and metabolism of nucleic acids in the context of their biological function in information transfer. Emphasis will be on the current research literature. Weight: 3. *Modrich and staff*

MIC-269(B). * Advanced Cell Biology. An advanced course in cell biology with emphasis on current research literature, and featuring in-depth discussion of selected areas by staff engaged in research in these areas. The course covers membrane structure and physiology, the cytoskeleton, cell motility systems, chromosome mechanics, structure and function, and eukaryotic gene structure, control, and replication. Weight: 3. *Endow and staff*

MIC-291(B). * Comprehensive Immunology. An intensive course in the biology of the immune system and the structure and function of its component parts. Major topics discussed are: properties of antigens; specificity of antibody molecules and their biologic functions; cells and organs of the lymphoid system; structure and function of complement; inflammation and nonspecific effector mechanisms; cellular interactions and soluble mediators in lymphocyte activation, replication, and differentiation; regulation of immune responses; neoplasia and the immune system; molecular structure and genetic organization of (a) immunoglobulins, (b) histocompatibility antigens, and (c) T cell receptor. Weight: 4. *Argon and staff*

MIC-296(B). Contemporary Molecular Immunology. A detailed study at the molecular level of some of the latest developments in immunology. The subject matter, although variable and continually updated to keep it fresh, will be concerned with three general areas: (a) the molecular analysis of the cellular components and processes which underlie the biological behavior of the cells involved in immune phenomena; (b) the chemical and physical properties of antigens and antibodies and the physical-chemical analysis of antigen-antibody interaction; (c) recent methodological advances contributing to or resulting from a and b. Weight: 3. *Day, Cresswell, and Sage*

MIC-301(B). Principles of Infectious Disease. A lecture and seminar course to familiarize students with the basic biologic concepts, the pathogenesis, and the clinical manifestations of infectious diseases caused by bacteria, viruses, fungi, rickettsia. The host defenses to infectious agents including the acute inflammatory response and humoral and cellular immunity, and current and future trends in the development of vaccines and antimicrobial and antiviral agents will also be discussed. Weight: 6. *Wilfert, Lehrman, Gutman, Katz, Durack, Mitchell, Osterhout, Joklik, and Keene*

MIC-306(B). Clinical Microbiology. A bench-training course in methods used in clinical microbiology stressing isolation, characterization, and antibiotic susceptibility testing of clinically significant microorganisms. Course conducted in Duke microbiology division laboratories. Prerequisite: permission of instructor. Weight: 8. *Klein*

MIC-308(B). Clinical Microbiology-Immunology. A bench-training course in methods used in clinical microbiology stressing isolation and characterization of clinically significant microorganisms. Course conducted in the V.A. Hospital microbiology laboratory. Weight: 8. *Zwadyk*

MIC-325(B). * Medical Mycology. Comprehensive lecture and laboratory coverage of all the fungi pathogenic for humans. The epidemiology, clinical manifestations, diagnosis, host responses and treatment of each mycotic disease will be explored, along with the biology, ecology, immunology, and mechanisms of pathogenicity of the fungal agents. Both practical aspects and future trends in clinical mycology, as well as the dynamics of host-fungal interactions will be covered. There will be several invited lecturers, each an internationally recognized scientist, discussing their particular areas of mycological expertise and current research. Weight: 4. *Mitchell*

MIC-330(B). * Medical Immunology. This is a comprehensive course in clinical immunology which attempts to define the role that immunology plays in the etiology, diagnosis, nosology, and therapy of human disease. The course includes some lectures on basic and applied immunology but many lectures are given by faculty members from clinical departments. Weight: 6. *Ward and staff*

MIC-336(B). * Contemporary Topics in Immunogenetics. Selected themes in immunogenetics with special emphasis on molecular approaches. The major areas discussed are: the nature, interaction and expression of immunoglobulin genes and T cell receptor genes, the genes of the major histocompatibility complex, and the genes of the T/t complex. The central ideas discussed include the manner in which cells recognize and interact with each other in phylogeny, ontogeny, and in differentiation;

how gene families evolve and interact, and how information about these complex genetic systems is used in basic research and in clinical medicine. Prerequisite: MIC-291(B). Weight: 2. *Amos and Ward*

MIC-339(B). Diagnostic Microbiology and Infectious Disease. Introduction to the methods for the laboratory diagnosis of infectious disease and their clinical application. Basic biologic and clinical aspects will be correlated in a seminar-lecture format. Weight: 2. *Suydam Osterhout*

MIC-399(B). Preceptorship in Microbiology and Immunology. An individual reading and/or laboratory course in specialty areas supervised by an individual faculty member. Acceptance, nature of topic, and amount of credit by individual arrangement with proposed faculty member. Weight: 1-8 per 8 weeks. *Microbiology and immunology staff*

MIC-403(B). Investigative Problems in Disease Caused by Viruses, Mycoplasmas, Bacteria, and Fungi. Introduction to techniques for research with viruses, mycoplasmas, bacteria, and fungi; clinical experience with infectious diseases related to the investigative programs. The student will be involved in some aspect of laboratory research, and should consult with the investigator with whom work will be done prior to signing up for the course. Weight: 8. *Wilfert, Granger, Perfect, Durack, Hamilton, and Gallis*

MIC-405(B). Research in Immunohematology. The course is designed to provide the opportunity for students to select a project involving immunohematologic techniques and to pursue, through original research, the project conclusion. In particular, projects concerned with complement, red cell lysis, and red cell antigens will be stressed. Close supervision will be provided. Weekly seminars in immunohematology will be held. Library readings will be stressed. Weight: 6-8. *Rosse*

MIC-411(B). * Molecular and Cellular Bases of Development and Differentiation. Emphasis is placed on the biochemistry of the cell surface as the basis of cell recognition, control of cell cycle and overall tissue organization. An analysis of protein nucleic acid interactions in chromosome structure and function are considered in light of newer concepts of transcriptional and translational control. Studies also include nuclear cytoplasmic interactions as well as hormone induction of differentiation and development. The course is designed to study the phenomena of development and differentiation and has been organized on a multidisciplinary level. The course is part of the lecture series of the development and differentiation study program, DDS-201(B). Weight: 3-4. *McCarty, Counce, Kaufman, and Padilla*

Obstetrics and Gynecology

Professor: Charles B. Hammond, M.D., E. C. Hamblen Chair of Reproductive Biology and Family Medicine, (Duke, 1961), *Chairman*.

Professors: Arthur C. Christakos, M.D. (Med. Coll. of South Carolina, 1955); James M. Ingram Professor of Gynecologic Surgery William T. Creasman, M.D. (Baylor, 1966); Allen P. Killam, M.D. (Texas, 1960); Roy T. Parker, M.D., F. Bayard Carter Chair of Obstetrics and Gynecology, (Med. Coll. of Virginia, 1944); Warren E. Patow, M.D. (Marquette, 1947); Charles H. Peete, Jr., M.D. (Harvard, 1947); David W. Schomberg, Ph.D. (Purdue, 1965); E. Lee Tyrey, Ph.D. (Illinois, 1969).

Associate Professors: W. Allen Addison, M.D. (Duke, 1960); Arthur F. Haney, M.D. (Arizona, 1972); Gail B. Hill, Ph.D. (Duke, 1966).

Assistant Professors: Nels C. Anderson, Ph.D. (Purdue, 1964); Lawrence C. Bandy, M.D. (Duke, 1977); Marc A. Bernhisel, M.D. (Utah, 1979); Jane E. Brazey, M.D. (Washington Univ., 1972); Kenneth Fortier, M.D. (Dartmouth, 1976); Arnold S. Grandis, M.D. (Duke, 1974); Vanessa P. Haygood, M.D. (Harvard, 1978); James F. Holman, M.D. (Arkansas, 1970); Charles H. Livengood III, M.D. (Duke, 1976); Helen Kay, M.D. (Yale, 1979); Jeffrey V. May, Ph.D. (Rhode Island, 1978); David L. Olive, M.D. (Baylor, 1979); Patricia M. Saling, Ph.D. (Pennsylvania, 1979); John T. Soper, M.D. (Iowa, 1978); John F. Steege, M.D. (Yale, 1972); Anna L. Stout, Ph.D. (South Carolina, 1980); Kenneth Trofatter, M.D. (Duke, 1979); Camille J. Wahbeh, M.D. (Lebanon, 1980).

Assistant Clinical Professors: James L. Allen, M.D. (Emory, 1965); John V. Arey, M.D. (Harvard, 1946); Rudy W. Barker, M.D. (North Carolina at Chapel Hill, 1967); Gary S. Berger, M.D. (Rochester, 1969); David B. Crosland, M.D. (North Carolina at Chapel Hill, 1958); Yancey G. Culton, Jr., M.D. (Duke, 1956); Jerry L. Danford, M.D. (Duke, 1967); Crowell T. Daniel, Jr., M.D. (Med. Coll. of Virginia, 1948); Michael D. Fried, M.D. (New York, 1971); Carl A. Furr, Jr., M.D. (North Carolina at Chapel Hill, 1958); E. C. Garber, Jr., M.D. (Med. Coll. of Virginia, 1944); Michel Goubran, M.D. (Cairo, Egypt, 1962); John W. Lane, M.D. (Duke, 1972); Richard L. Lassiter, M.D. (North Carolina at Chapel Hill, 1965); Donald T. Moore, M.D., (Meharry, 1958); William A. Nebel, M.D., (North Carolina at Chapel Hill, 1962); Phillip H. Pearce, M.D. (Duke, 1960); Steven M. Scott, M.D. (Indiana, 1974); Robert K. Yowell, M.D. (Duke, 1961).

Associates: William C. Dodson, M.D. (Temple, 1980); Marvin Hage, M.D. (Michigan, 1967); David Mutch, M.D. (Washington Univ., 1980).

Clinical Associates: Francis S. Gardner, Jr., M.D. (Maryland, 1951); Ronald E. Granger, M.D. (California at Irvine); Charles O. Harris, M.D. (Duke, 1979); Bennet A. Hayes, M.D. (North Carolina at Chapel Hill, 1957); Clayton J. Jones, M.D. (Tennessee, 1952); Glenward T. Keeney, M.D. (Med. Coll. of Virginia, 1967); William R. Lambeth, M.D. (Bowman Gray, 1974); Jack P. McDaniel, M.D. (North Carolina at Chapel Hill, 1956); Dudley C. Miller, M.D. (Missouri, 1959); E. Frank Shavender, M.D. (North Carolina at Chapel Hill, 1968); Joseph A. Stephens, M.D. (Pittsburgh, 1952); Thomas A. Stokes, Jr., M.D. (Duke, 1955); Allen H. Van Dyke, M.D. (Bowman Gray, 1971); Paul A. Vieta, M.D. (New Jersey, 1966); Bertram E. Walls, M.D. (Duke, 1972).

Research Associates: Christopher Carron, Ph.D.; Louise A. Kaufmann, B.A.; Lawrence Kodack, B.A.; Mark S. Kronenberg, Ph.D.; Robert Waibel, Ph.D.

Required Course

In Introduction to Clinical Medicine the first-year student receives instruction in the fundamentals of obstetric and gynecologic history and pelvic examinations.

OBG-205. Required of all second-year students—consists of eight weeks in general obstetrics and gynecology. Students attend lectures, work daily in the general and special outpatient clinics, and are assigned patients on the obstetric and gynecologic wards. Students share in patient care, teaching exercises, and in daily tutorial sessions with the faculty. Clinical conferences, a gynecologic-pathology conference, endocrine conferences, and correlative seminars and lectures are included.

Electives

OBG-210(C). Gynecologic Cancer. This course presents a clinical experience in the management of the patients with a gynecologic malignancy. The student will assume the role of an extern. Outpatient, inpatient, and operative exposure to these patients will be extensive. Weight: 4 or 8. *Creasman, Parker, Soper, Brazey, and Mutch*

OBG-213(C). Preparation for Practice, Cape Fear Valley Hospital, Fayetteville Area Health Education Center. This is a unique opportunity to receive both didactic exposure and clinical experience in obstetrics and gynecology in Cape Fear Valley Hospital, a large community hospital in Fayetteville, North Carolina, where almost 4,000 patients are delivered each year. The student will actively participate in the care of patients in the labor and delivery rooms, assist at surgery, and render post-operative care. This is a community hospital experience rather heavily weighted in clinical obstetrics. Students will be exposed to a large volume of clinic opportunities. Two senior residents from Duke rotate through Cape Fear Valley Hospital. The student will be directly supervised by Dr. Warren Patow (full-time Duke faculty at Cape Fear) and Dr. Ed Garber, in addition to Duke obstetrics and gynecology residents. Weight: 4. *Hammond, Patow, Garber, and staff of Cape Fear Valley Hospital*

OBG-229(C). Endocrinology Seminar. Sessions with discussion of interesting clinical problems and related clinical and basic research in gynecologic endocrinology. Weight: 1. *Haney, Holman, Hammond, Schomberg, Tyrey, Saling, and fellows on Endocrine Division*

OBG-231(C). Clinical Reproductive Endocrinology. Course for students who desire additional basic and clinical experience in examination, diagnosis, and treat-

ment of obstetric and gynecologic patients with endocrinopathy and infertility. Course consists of instruction in clinical reproductive problems correlated with examination and treatment of patients both in the Endocrinology Outpatient Clinic and in the hospital. Weight: 4. *Haney, Holman, Hammond, Schomberg, Tyrey, Saling, and fellows on Endocrine Division*

OBG-239(C). Perinatal Medicine. A study of the relationship of clinical factors during pregnancy, labor, delivery, and the first month of life. Emphasis will be placed on abnormal conditions of pregnancy as related to the infant, prenatal pathological conditions adversely afflicting the fetus and newborn, and early management of the infant. Current problems in maternal-fetal relationships will be outlined. The clinical rotation will consist of half time on the high-risk obstetric service and half time on the nursery service. (Duke North, ICN, or Duke South nurseries.) See also PED 239 and PED 225. Weight: 8. Must contact Killam prior to registration. *Killam*

OBG-243(C). Sex Education. This course is designed to prepare health professionals for dealing with situations involving sex education and counseling. A series of fourteen undergraduate lectures, given as part of the undergraduate course, Zoology 198.6, "Human Sex and Sexuality," will survey biological, psychological, sociocultural, and ethical aspects of human sexuality. Additional training sessions, specifically for medical students, will deal with the design, organization, and implementation of educational and counseling programs. The final eight weeks of the course will be spent gaining practical experience. Projects may be of the student's design, approved by the committee, or the student may participate in one of the ongoing projects of the committee such as teaching the seventh grade curriculum in the public schools. Weight: 3. *Steege and Christakos*

OBG-245(C). Office Gynecology. For students preparing for general practice, medicine, pediatrics, and surgery. Outpatient clinic and emergency room diagnosis and patient care are taught. Weight: 4 or 8. *Addison and staff*

OBG-247(C). Clinical Obstetrics. For students preparing for general practice and medicine or pediatrics. Antepartum, intrapartum and postpartum patient care are stressed and practical experience in the delivery room is provided at an intern level. Weight: 4 or 8. *Killam, Grandis, Kay, and fellows on obstetrical service*

OBG-249(C). Clinical Gynecology. For students preparing for general practice, surgery, and urology. Preoperative diagnosis and preparation and postoperative care are stressed. In addition, minor operative procedures are taught and students assume the responsibilities of an intern. Weight: 4 or 8. *Peete, Addison, Christakos, Livengood, Fortier, Haygood, and staff*

OBG-250(C). Psychosomatic Gynecology. For students in obstetrics and gynecology, family practice, and internal medicine. This course will emphasize clinical experience in the diagnosis and treatment of chronic pain, as well as the management of other psychosomatic and psychophysiologic problems in gynecologic practice. Clinical research may be undertaken by arrangement. Must contact Dr. Steege prior to registration. Weight: 1-3. *Steege and Stout*

OBG-253(C). Preparation for Practice, Cabarrus Memorial Hospital, Concord, North Carolina. This is an opportunity to receive both didactic exposure and clinical exposure in obstetrics and gynecology in the community hospital. The student will be expected to function as an intern and will participate actively in the care of the patients in the labor and delivery area, assist at surgery, and render postpartum and postoperative care. This is a community hospital experience rather heavily weighted in clinical obstetrics. The student will be exposed to a large volume of clinical material. The practitioners in the community are all board-certified obstetricians and gynecologists and are interested in student teaching. A Duke faculty person will provide

additional guidance by visits once per week. This elective can be taken for four weeks for 4 units or eight weeks for 8 units. The student will be housed in quarters available for them. Weight: 4, 6, or 8. *Hammond and staff of the Cabarrus Memorial Hospital*

Ophthalmology

Professor: Helena Rubenstein Foundation Professor of Ophthalmology Robert Machemer, M.D. (Freiburg, Germany, 1959), *Chairman*.

Professors: W. Banks Anderson, Jr. M.D. (Harvard, 1956); Diane Van Horn Hatchell, M.D. (Marquette, 1968); Gordon K. Klintworth, M.D. (Univ. of Witwatersrand, 1957), Ph.D. (Univ. of Witwatersrand, 1966); Maurice B. Landers III, M.D. (Michigan, 1963); M. Bruce Shields, M.D. (Oklahoma, 1966).

Associate Professor: Gary N. Foulkes, M.D. (Columbia, 1970).

Assistant Professors: Edward G. Buckley, M.D. (Duke, 1977); Michael L. Cobo, M.D. (Harvard, 1975); Jonathan J. Dutton, M.D. (Washington, 1977); Brooks W. McCuen II, M.D. (Columbia, 1974); Alan D. Proia, Ph.D. (Rockefeller, 1979), M.D. (Cornell, 1980).

Associate: Eugene deJuan, M.D. (Alabama, 1979).

Associate Clinical Professors: Arthur C. Chandler, Jr., M.D. (Duke, 1959); Edward K. Isby, Jr., M.D. (Wayne, 1955); Lawrence W. Moore, Jr., M.D. (Duke, 1963).

Clinical Professor: Samuel D. McPherson, Jr., M.D. (Johns Hopkins, 1943).

Assistant Clinical Professors: John W. Cline, M.D. (North Carolina at Chapel Hill, 1966); Robert D. Dawson, M.D. (Meharry, 1943); Edward M. Hedgepeth, M.D. (North Carolina at Chapel Hill, 1962); Thomas C. Kerns, M.D. (Duke, 1950); Walter C. McLean, Jr., M.D. (Virginia, 1975); Judy H. Seaber, B.A. (Emory, 1962); Charles F. Sydnor, M.D. (Virginia, 1969); James S. Tiedeman, M.D. (Duke, 1977).

Clinical Associates: Thomas L. Beardsley, M.D. (Duke, 1971); Dorothy Bell, M.D. (North Carolina at Chapel Hill, 1980); Linda L. Burke, M.D. (Michigan, 1980); J. Thomas Foster, M.D. (Duke, 1958); William R. Harris, M.D. (North Carolina at Chapel Hill, 1956); John H. Killian, M.D. (Bowman Gray, 1967); Martin J. Kreshon, M.D. (Marquette, 1954); W. Hampton Lefler, M.D. (Bowman Gray, 1963); Joseph A. Locascio, M.D. (Virginia, 1975); Edward E. Moore, M.D. (Harvard, 1942); Karl R. Olsen, M.D. (Northwestern, 1980); Jeffrey S. Rinkoff, M.D. (Baylor, 1979); Harold E. Shaw, Jr., M.D. (Med. Univ. of South Carolina, 1973).

Research Associate: Tetsu Hida, M.D. (Keio Univ., 1973).

Emeritus: Joseph A. C. Wadsworth, M.D.

Electives

OPH-210(C). Medical Ophthalmology. The ophthalmic signs and symptoms of systemic disease are presented in a lecture series. Oriented for those students interested primarily in pediatrics, internal medicine, or ophthalmology. Weight: 1. *Shields and Tiedeman*

OPH-212(C). General Ophthalmology. A clinical preceptorship in which the student will participate and observe in the regular house staff activities, conferences, lectures, patient care, and treatment including surgery. Emphasis on the use of specialized ophthalmic apparatus is emphasized. Weight: 3-8. *Shields*

OPH-213(C). Ophthalmic Pathology. The student will review all ophthalmic pathology specimens submitted weekly and any pertinent permanent specimens, and will aid in presentation of cases at weekly ophthalmic pathology conferences. Weight: 1. *Klintworth*

OPH-214(C). Investigative Ophthalmology. The student is assigned a project relating to basic ophthalmologic problems. Technical assistance, sufficient equipment and laboratory animals are supplied for the completion of the project. The student is expected to attend lectures scheduled for the house staff. Weight: 4-8. *Klintworth*

OPH-215(C). Ocular Diseases in Children. The study of ocular disease in children includes muscular imbalances, congenital disorders, and neoplastic diseases to acquaint the student with a special pediatric and ophthalmologic phase. Weight: 1. *Bucklely and Seaber*

Pathology

Professor: James B. Duke Professor Robert B. Jennings, M.D. (Northwestern, 1950), *Chairman*.

Professors: Dolph O. Adams, M.D. (Med. Coll. of Georgia, 1965); Ph.D. (North Carolina at Chapel Hill, 1972); Darell D. Bigner, M.D. (Duke, 1965), Ph.D. (Duke, 1971); Edward H. Bossen, M.D. (Duke, 1965);

William D. Bradford, M.D. (Western Reserve, 1958); Bernard F. Fetter, M.D. (Duke, 1944); Donald B. Hackel, M.D. (Harvard, 1946); William W. Johnston, M.D. (Duke, 1959); Gordon K. Klintworth, M.D. (Univ. of Witwatersrand, 1957), Ph.D. (Univ. of Witwatersrand, South Africa, 1966); John A. Koepke, M.D. (Wisconsin, 1956); Philip C. Pratt, M.D. (Johns Hopkins, 1944); Kenneth A. Schneider, M.D. (Northwestern, 1959); Joachim R. Sommer, M.D. (Munich, 1951); F. Stephen Vogel, (Western Reserve, 1944); Benjamin Wittels, M.D. (Minnesota, 1952).

Adjunct Professor: Paul Nettesheim, M.D., D.M.S. (Bonn, West Germany, 1959).

Associate Professors: Sandra H. Bigner, M.D. (Tennessee, 1971); Peter C. Burger, M.D. (Northwestern, 1966); Jane G. Elchlepp, M.D. (Chicago, 1955), Ph.D. (Iowa, 1948); Doyle G. Graham, M.D. (Duke, 1966); Raymond E. Ideker, M.D. (Tennessee, 1971); Kenneth McCarty, Jr., M.D. (Duke, 1972), Ph.D. (Duke, 1973); George Michalopoulos, M.D. (Athens, 1969), Ph.D. (Wisconsin, 1977); Salvatore Pizzo, M.D. (Duke, 1972), Ph.D. (Duke, 1973); Keith A. Reimer, M.D. (Northwestern, 1972); Alfred Sanfilippo, Ph.D. (Duke, 1975), M.D. (Duke, 1976); John D. Shelburne, M.D. (Duke, 1972); Frances King Widmann, M.D. (Case Western Reserve, 1960); Peter Zwadyk, Jr., Ph.D. (Iowa, 1971).

Adjunct Associate Professors: Jacob S. Hanker, Ph.D. (Maryland, 1969); James A. Swenberg, D.V.M. (Minnesota, 1966), Ph.D. (Ohio, 1970).

Assistant Professors: John L. Abernathy, M.D., Ph.D. (Duke, 1980); Michael J. Borowitz, M.D., Ph.D. (Duke, 1977); Robert H. Christenson, Ph.D. (Florida State, 1980); Barbara J. Crain, M.D. (Duke, 1979); Robert L. Habig, Ph.D. (Purdue, 1966); Victor L. Roggli, M.D. (Baylor, 1976); Marcus Simpson, M.D. (North Carolina at Chapel Hill, 1972); Charles Steenbergen, M.D. (Pennsylvania, 1978), Ph.D. (Pennsylvania, 1979); Cheryl L. Szpak, M.D. (Southwestern, 1977); John Toffaletti, Ph.D. (North Carolina at Chapel Hill, 1977).

Assistant Clinical Professors: Jane Gaede, M.D. (Duke, 1966); Robin T. Vollmer, M.D. (Duke, 1967).

Assistant Medical Research Professors: James F. Bresnahan, D.V.M. (Illinois, 1973); Steven S. Geier, Ph.D. (Duke, 1978); Thomas A. Hamilton, Ph.D. (Oregon, 1976); Carol W. Lewis, Ph.D. (North Carolina at Chapel Hill, 1972); James G. Lewis, Ph.D. (Duke, 1982); Emily A. G. Reisner, Ph.D. (Case Western, 1969); Gideon Strassman, Ph.D. (Weizmann Inst. of Science, 1981).

Adjunct Assistant Professors: Arnold R. Brody, Ph.D. (Colorado, 1969); Jack A. Dean, Ph.D. (Arizona, 1972); Peter Ingram, Ph.D. (Univ. of Southampton, England, 1967); Ralph C. McCoy, M.D. (Emory, 1967); Frank A. Sedor, Ph.D. (Florida, 1971).

Associates: Anthony R. Bierre, M.B., Ch.B. (Univ. of Auckland, 1978); John A. Bittikofer, Ph.D. (Purdue, 1971); Kenneth R. Broda, Ph.D. (Duke, 1977); J. E. Phillip Pickett, H.T.; Margaret C. Schmidt, M.A. (Louisville, 1969).

Required Course

PTH-200. The core course in pathology is given during the second term of the first year. Fundamentals of pathology are presented by correlating gross and microscopic material to illustrate the structural changes in disease. Lectures dealing with broad concepts of disease processes are presented by senior faculty, and conferences with small groups of students are held under the guidance of staff members. Etiology and pathogenesis of disease, as well as the experimental approach are emphasized for the purpose of correlation with clinical disease. In addition to group work, conferences are scheduled to discuss problems derived from autopsies. Students are required to collaborate in postmortem studies and present cases in clinical-pathologic conferences under the direction of the staff.

Electives

PTH-223(B). Autopsy Pathology. The course is intended to introduce students to the autopsy as an investigative tool; anatomic-clinical correlation is emphasized. Students work directly with one or more members of the Pathology Department. They will first assist at autopsies and then perform autopsies under supervision. They will work up these cases with particular attention to correlations with clinical and experimental medicine, prepare the final autopsy reports on them, and will work essentially at the level of a house officer. Students will be expected to present their findings at staff conferences. If the course is oversubscribed, the students will be chosen by lot. Weight: 8. *Adams and staff*

PTH-225(B). Cardiovascular Pathology. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic, and physiologic features, and utilizing case material and gross specimens. Clinicopathologic correlation will be stressed. Weight: 2. *Hackel, Reimer, and Ideker*

PTH-231(B). *Ophthalmic Pathology. This course is designed for students with an interest in ophthalmic diseases and particularly for those planning a career in pathology or ophthalmology, and will consist of lectures, seminars, and laboratory sessions. The normal anatomy and embryology of the eye will be reviewed, and the various reactions of the eye to injury will be studied in gross and microscopic specimens. The more common diseases will be considered in detail. Weight: 3. *Klintworth*

PTH-237(B). Surgical Pathology. This course is designed for the student who wishes more experience in the study of disease. Although the course is entitled *Surgical Pathology*, this does not imply interest solely in the individual oriented to surgery. Problems in dermatology, gynecology, orthopaedics, general surgery, internal medicine, and other specialties will be considered. The program of study will consist of lectures, demonstrations, and laboratory work. Microscope required (limited number available on loan). Weight: 4. *Fetter*

PTH-241(B). * The Pathologic Basis for Clinical Medicine. Disease processes will be studied in terms of organ systems, with the intention of enabling students to crystallize the basic processes studied in Pathology 200. Clinicopathologic correlation will be stressed, utilizing gross and microscopic examples of disease processes, case studies, lectures, and demonstrations. This is a survey course and does not treat any one subject in great depth. Weight: 4. *Hackel and staff*

PTH-281(B). Cytopathology Preceptorship. This course consists of a full-time rotation by the student in the diagnostic cytopathology laboratories. By working with the laboratory staff, the student will explore in detail the role played by exfoliative cytopathology in the diagnosis of disease. Although not a requirement, the student will be encouraged to pursue special research projects. Weight: 8. *Johnston, Bossen, Bigner, and staff*

PTH-342(B). Special Topics in Pathology. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Permission of instructor required. Weight: 1-16. *Jennings and staff*

PTH-346(B). * Subcellular and Molecular Pathology. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. A series of lectures and seminars will be presented on the alterations in cellular structure and associated function that accompany cell injury. Ultrastructural changes in selected human diseases will be discussed in detail with emphasis on diagnosis and pathogenesis. Weight: 2. *Jennings, Shelburne, and Sommer*

PTH-348(B). Practical Surgical Pathology. This course will be in the form of an apprenticeship in which the student will work closely with the resident in the actual preparation and diagnosis of tissue changes. Microscope required (limited number available on loan). Weight: 8. *Rossen and staff*

PTH-353(B). * Neuropathology. A view of neuropathology that emphasizes clinicopathologic correlation. Weight: 3. *Vogel and staff*

PTH-359(B). * Fundamentals of Electron Microscopy. Emphasis will be placed on the theory and application of electron microscopy to ultrastructural pathology. The methods relating to electron microscopy, as well as X-ray microanalysis and ion microscopy, will be considered. Laboratory experience will be included. Weight: 3. *Shelburne and Sommer*

PTH-362(B). * Pathology of the Kidney. This course is a comprehensive study of pathological, immunological, and clinical features of the various types of glomerulonephritis, nephrotic syndrome, and pyelonephritis, as well as of metabolic, congenital, and neoplastic renal disorders. Lectures will be supplemented with gross and

microscopic specimens, demonstrations, clinico-pathological discussions and student seminars. Weight: 3. *Sanfilippo, and Jennings*

PTH-364(B). Skeletal Pathology. Special problems in skeletal pathology will be dealt with beginning with a discussion of the development of connective tissue. Special emphasis on bone tumors, metabolic diseases, and traumatic problems will be considered. Weight: 2. *Harrelson*

PTH-366(B). * Pulmonary Pathology and Pathophysiology. Emphasis will be on pulmonary pathology and pathophysiology of infectious, metabolic, environmental, and neoplastic diseases, and certain diseases of unknown etiology (e.g., sarcoid, alveolar proteinosis, etc.). Weight: 3. *Pratt and Roggli*

PTH-368(B). Seminar in Neonatal and Pediatric Pathology. This is a seminar course covering specific topics in developmental anatomy and major pathologic processes of the brain, lung, gastrointestinal, and urinary tracts. Emphasis will be on gross, microscopic pathology, and clinicopathologic correlation. These students will assume responsibility for presentations of material in individual seminars. Designed for students entering pathology and clinical pediatrics. Weight: 2. *Bradford*

PTH-371(B). The Laboratory Basis for Clinical Medicine. This course will emphasize evaluation and interpretation of laboratory data relative to pathophysiologic processes. Development of judgment and selectivity in utilizing laboratory tests will be taught. Course will consist of lectures and conferences. Clinicopathologic correlation will be stressed by detailed case studies of specific patients. Weight: 2. *Gaede, Widmann, Pizzo, and Zwadyk*

PTH-372(B). Environmental Diseases. The course features guest lecturers and student presentations to cover examples of disease produced by technological exploitation of the earth and "life study." Subjects include population, respiration-air and ocean, and examples of diseases due to asbestos, lead, mercury, hydrocarbons, carcinogens, organic dusts, DDT, cigarette smoke, etc. Weight: 2. *Pratt and Lynn*

PTH-373(B). Diagnostic Immunopathology. The course reviews diagnostic and laboratory procedures used in evaluating immunologic diseases; especially autoimmune, infectious, immunodeficiency, immunoproliferative, and hypersensitivity disorders. Emphasis is placed on the theoretical and practical aspects of testing procedures and their proper interpretation. Weight: 2. *Sanfilippo, Zwadyk, Buckley, and Snyderman*

PTH-374(B). * Pulmonary Structure and Function Seminar. Current and exemplar pathological material on lungs, including gross, histologic, and electron microscopic data, is correlated with *in vitro* function and clinical features; physiological measurements; and roentgenographic findings. The structural features of the types of reaction of lung cells to injury are interpreted against this background. Such demonstration material is correlated by lectures. Weight: 1. *Pratt, Lynn, and Roggli*

PTH-378(B). Seminars in Hematology. This is a systematic survey of the pathophysiology and morphology of human hematological diseases. Each student will survey the literature on several topics and prepare an oral presentation which will be critically discussed by the group. Opportunity for experience in blood, marrow, and lymph node analysis will be available. Weight: 2. *Wittels*

PTH-380(B). Surgical Pathology with Emphasis on Electron Microscopy. This course will be in the form of an apprenticeship in which the student will become engaged in the actual preparation and diagnosis of tissue changes using both light and electron microscopy. The student will, of necessity, learn how to operate the electron microscope. Weight: 8. *Shelburne and Vollmer*

PTH-385(B). * Cancer Biology. Emphasis will be on cellular biology of the cancer cell. The instructors will present topics on aspects of cancer research and will attempt

to correlate them with the biologic and clinical behavior of specific forms of neoplasia.
Weight: 4. *Michalopoulos and Falletta*

Pediatrics

Wilburt C. Davison Professor Samuel L. Katz, M.D. (Harvard, 1952), *Chairman*.

Professors: Page A. W. Anderson, M.D. (Duke, 1963); James B. Sidbury Professor Rebecca H. Buckley, M.D. (North Carolina at Chapel Hill, 1958); John M. Falleta, M.D. (Kansas, 1966); Howard Filston, M.D. (Western Reserve, 1962); Thomas E. Frothingham, M.D. (Harvard, 1951); Herman Grossman, M.D. (Columbia, 1953); Stuart Handwerker, M.D. (Maryland, 1964); Donald Kirks, M.D. (Washington Univ., 1968); Charles R. Roe, M.D. (Duke, 1964); James B. Duke Professor Madison S. Spach, M.D. (Duke, 1954); Alexander Spock, M.D. (Maryland, 1955); Catherine M. Wilfert, M.D. (Harvard, 1962).

Associate Professors: Roger C. Barr, Ph.D. (Duke, 1968); Jane E. Brazy, M.D. (Washington Univ., 1972); Rosalind Coleman, M.D. (Western Reserve, 1969); Bernard J. D'Souza, M.B., Ch.B. (Makerere, Kampala, Uganda, 1967); Seymour Grufferman, M.D. (New York at Syracuse, 1964); Dr.P.H. (Harvard, 1979); Laura T. Gutman, M.D. (Stanford, 1963); Lowell King, M.D. (Johns Hopkins, 1956); Thomas R. Kinney, M.D. (Duke, 1970); David R. Merten, M.D. (Cincinnati, 1956); Myron B. Peterson, M.D. (Colorado, 1976); Jonathan I. Scheinman, M.D. (Illinois, 1966); Gerald Serwer, M.D. (Duke, 1971).

Assistant Professors: Brenda E. Armstrong, M.D. (St. Louis, 1974); David Auerback, M.D. (Albert Einstein, 1974); William D. Bradford, M.D. (Western Reserve, 1958); Y. T. Chen, M.D. (Taiwan Univ., 1973), Ph.D. (Columbia, 1978); Peter C. English, M.D., Ph.D. (Duke, 1975); Michael Freemark, M.D. (Duke, 1976); Henry Friedman, M.D. (New York at Syracuse, 1977); Stephen Gehlbach, M.D. (Western Reserve, 1968); William Greeley, M.D. (Texas at Houston, 1976); Harold J. Harris, M.D. (Long Island Coll. of Med., Brooklyn, 1949); J. David Jones, M.D. (Duke, 1954); Stephen G. Kahler, M.D. (Duke, 1973); Raymond S. Kandt, M.D. (Virginia, 1976); Sue Y. S. Kimm, M.D. (Yale, 1964); Deborah W. Kredich, M.D. (Michigan, 1962); Joanne Kurtzberg, M.D. (New York Med. Coll., 1976); Jeannine G. Leatherman, M.D. (Vermont, 1978); Darrell V. Lewis, M.D. (Minnesota, 1969); Mary Ann Morris, M.D. (Arkansas, 1972); Shirley K. Osterhout, M.D. (Duke, 1957); M. Henderson Rourke, Jr., M.D. (Pennsylvania, 1963); Hugh Sampson, M.D. (New York at Buffalo, 1975); Richard I. Schiff, M.D., Ph.D. (Duke, 1976); Robert J. Thompson, Jr., Ph.D. (North Dakota, 1971); Mary E. Vernon, M.D. (Columbia, 1976); Rita Vileisis, M.D. (Northwestern, 1975); Gordon Worley, M.D. (Harvard, 1973).

Associates: Edward G. Buckley, M.D. (Duke, 1977); Robert D. Fitch, M.D. (Duke, 1976); Nancy Friedman, M.D. (Med. Coll. of Virginia, 1975); Jerry Oakes, M.D. (Duke, 1972); Deborah Squire, M.D. (Northwestern, 1978).

Clinical Professor: William J. A. DeMaria, M.D. (Duke, 1948).

Associate Clinical Professors: William L. London, M.D. (North Carolina at Chapel Hill, 1955); Howard H. Loughlin, M.D. (Pennsylvania, 1970); George M. Lyon, Jr., M.D. (Duke, 1961); A. W. Renuart III, M.D. (Duke, 1955); Evelyn Schmidt, M.D. (Duke, 1951); W. Samuel Yancey, M.D. (Duke, 1965).

Assistant Clinical Professors: Clarence Bailey, M.D. (North Carolina at Chapel Hill, 1955); Allen Cato, M.D. (Duke, 1969); James S. Hall, M.D. (Duke, 1957); Alvin H. Hartness, M.D. (Bowman Gray, 1965); Marcia Herman-Giddens, P.A. (Duke, 1968); Sandra Lehrman, M.D. (Brown, 1976); Thomas M. McCutchen, M.D. (Vanderbilt, 1963); Charles B. Neal, M.D. (Duke, 1955); Nicholas A. Patrone, M.D. (Loyola, 1976); John C. Pollard, M.D. (Virginia, 1968); William C. Powell, M.D. (Bowman Gray, 1952); Jimmie L. Rhyne, M.D. (Maryland, 1948); A. Douglas Rice, M.D. (Duke, 1951); James B. Rouse, M.D. (Duke, 1965); Christine Rudd, Pharm. D. (North Carolina at Chapel Hill, 1983); Robert J. Senior, M.D. (Jefferson, 1955); Frank S. Shaw, M.D. (Pennsylvania, 1959); Charles I. Sheaffer, M.D. (Western Reserve, 1958); S. Winston Singleton, M.B. (Manchester, England, 1952); Fred R. Stowe, M.D. (North Carolina at Chapel Hill, 1958); Robert W. Warren, M.D., Ph.D. (Washington Univ., 1978).

Clinical Associates: Lillis Altschuller, M.D. (Cincinnati, 1960); Joanne Barton, M.Sc. (Kentucky, 1974); Mary Jane Burns, M.S.W. (North Carolina at Chapel Hill, 1974); Meade R. Christian, Jr., M.D. (Western Reserve, 1967); Dennis A. Clements, M.D. (Rochester, 1973); William G. Conley, M.D. (Med. Coll. of Virginia, 1960); W. LaDell Douglas, M.D. (Georgetown, 1974); Muki W. Fairchild, M.S.W. (North Carolina at Chapel Hill, 1976); Jean Findlay, M.B. (Aberdeen Univ. Med. Sch. Scotland, 1970); Gregory Fisher, M.D. (South Florida, 1976); Richard Gugelmann, M.D. (Texas at Galveston, 1971); Larry C. Harris, M.D. (Duke, 1977); Rufus McP. Herring, Jr., M.D. (Bowman Gray, 1969); Jennifer L. Lail, M.D. (Kentucky, 1978); Pierre Le Master, M.D. (Florida, 1971); Allyn McConkie, M.S.W. (Arkansas, 1980); Brandy McDaniel, M.S.W. (North Carolina at Chapel Hill, 1979); Larry Mumford, M.D. (North Carolina at Chapel Hill, 1967); Susan Quinn-Pierce, M.S.W. (North Carolina at Chapel Hill, 1972); Craig R. Stenberg, Ph.D. (Denver, 1982); Janice Stratton, M.D. (Tulane, 1961); Joseph Whatley (Duke, 1958).

Research Associates: Janet Barrett, B.S. (East Carolina, 1965); Takako Kato, M.D. (Gunma Univ., Tokyo, 1983).

¹Associate Medical Research Professor: David Millington, Ph.D. (Liverpool, England, 1969).

Assistant Medical Research Professors: Dianne Y. Bell, Ph.D. (North Carolina State Univ., 1976); Raymond A. Sturner, M.D. (Georgetown, 1968); Carmen Wagner, Ph.D. (Arizona, 1981).

Required Course

PED-205. The basic course in pediatrics for all students—is an eight-week clerkship in the second year. Its principal aim is to provide an exposure to the field of child health. The student has a varying series of experiences which should give a grasp of the concepts that underlie the discipline. Goals should be to acquire familiarity and competence with the basic tools of information-gathering—the history, physical examination, and laboratory data

and to develop an approach to the integration of this material for the solution of problems of health and illness in infancy, childhood, and adolescence. This should be accomplished with continuing reference to the basic principles of pathophysiology encountered in the first year courses.

Those patients to whom the student is assigned will provide the focus for case studies. In addition to the careful history and physical examination which must be recorded, the student is expected to organize an appropriate differential diagnosis and to seek and read pertinent reference material relevant to each patient. The student should learn to present each case verbally in an organized and succinct fashion, to follow the patient's progress, and to interpret all studies which are performed. The student is expected to learn from a number of sources: standard textbooks and journals, current publications and conferences, and also from people—house staff, faculty, nurses, parents, and all others with whom contact is made in the clinical setting.

Objectives should also include an understanding of the roles played in pediatrics by other members of the health care team, both in the ambulatory and hospital settings. Patient care may include nurse, social worker, recreation therapist, psychologist, physiotherapist, dietitian, and/or others. The eight weeks will be divided to include time into several of the following settings: (a) Duke outpatient clinics and emergency room, (b) Duke inpatient, (c) Durham County General Hospital and (d) Duke nurseries.

Electives

PED-210(C). Advanced General Pediatrics. The senior student negotiates the schedule before the beginning of the course. In the Duke clinics, the student may become acquainted with most pediatric problems while beyond the walls of the hospital, there are opportunities for the student to participate in child health activities in the community in collaboration with a variety of child-serving professionals. Students are encouraged to select an area for in-depth examination, active participation, and the preparation of a report according to their interests, backgrounds, and anticipated career goals. Examples of available areas are behavior-development, adolescent medicine, rheumatology, child health, child abuse, and many others. Weight: up to 8. *Frothingham and staff*

PED-211(C). Pediatric Infectious Diseases. This course will provide experience in the clinical and laboratory diagnosis of infectious diseases and in their therapy. The student works closely with the infectious disease fellow and participates actively in evaluation of patients. There is opportunity to gain experience in a laboratory setting (bacteriology, virology). Weight: 4 or 8. *Wilfert, McKinney, Gutman, Lehrman, and Katz*

PED-215(C). Endocrine Disorders in Children. Students participate in the pediatric endocrine and pediatric diabetes clinics and in the inpatient activities of the endocrine division. Students also participate in the endocrine journal club and interdepartmental endocrine conferences. Emphasis is placed on the evaluation of growth and sexual development as indices of endocrine status during childhood. Weight: 4 or 8. *Handwerker, Morris, Friedman, and Freemark*

PED-216(C). Interdisciplinary Seminar in Clinical Oncology. Students will be presented with a comprehensive review of clinical oncology, including the epidemiology, pathogenesis, clinical-pathologic correlations, treatment, and prognosis for most human cancers. Relationships between basic science aspects and clinical medicine will be emphasized. Weight: 2. *Falletta and Michalopolous*

PED-217(C). Pediatric Hematology and Oncology. Includes all aspects of clinical and laboratory pediatric hematology, as well as the diagnostic evaluation, care, and treatment of patients with malignant diseases. Emphasis will be placed on fundamental concepts. There will be daily ward rounds, three weekly clinics, conferences and seminars, as well as assigned reading. Students will be encouraged to engage in some individual clinical or laboratory project during the period of the course. Weight: 4 or 8. *Faletta, Kinney, Kurtzburg and Friedman*

PED-221(C). Poison Control. Primarily a seminar course with one two-hour conference per week scheduled for student discussion on assigned topics. The student may participate in clinical functions of the center and if desired may be on call for the treatment of these cases in the emergency room or the ward. This is a student-oriented teaching program and individual projects on the subject may also be carried out. Weight: 2. *Shirley Osterhout*

* **PED-225(C). Neonatology.** Students will have patient care responsibilities and experiences in the nursery service, either Duke North ICN or Duke South nurseries. The course consists of participation in direct patient care under the supervision of the faculty and house staff. Emphasis is placed on the initiation of parent-child relationships, the assessment of and stabilization of stressed neonates, and the management of neonatal illnesses. No other courses are to be taken in conjunction with PED-225(C). Weight: 4. *Brazey, Auerbach, Leatherman, and Vileisis*

PED-227(C). Behavioral Aspects of Pediatrics. This course will offer trainees the opportunity to work as a part of an interdisciplinary team in diagnosing and treating children and adolescents (ages two to twenty-one) with a variety of psychiatric and psychosocial problems. Presenting problems might include a full spectrum of childhood and adolescent disorders: anorexia nervosa, bulimia, enuresis, encopresis, school phobia, psychosomatic disorders, tourette syndrome, suicidal and acting-out adolescents, chronically or terminally ill children, and child abuse and neglect cases. Trainees will be taught and will clinically apply principles of child and adolescent development and psychoanalytic family systems theory. The trainee will be involved in child, parent, and family interviews and treatment and will function as an integral part of the treatment team to experientially learn about the diagnosis and treatment of a wide variety of child and adolescent disorders. There will be an opportunity to be involved in the inpatient and outpatient treatment process on pediatric and adolescent psychiatric wards. (See also PSC-227.) Weight: 2-6. *Jones, Lee, Yancy, and Mrs. Burns*

PED-231(C). Clinical Pediatric Cardiology. Provides an intensive learning experience in clinical diagnosis and management of childhood heart disease. Emphasis is placed on the preoperative and postoperative management of children with operable heart disease as well as upon the management of children with nonoperable heart disease. Finally, the student is exposed to pediatric acute care medicine and modalities available to maintain cardiovascular function in the extremely ill child. Scope: history, physical examination, and special diagnostic techniques (electrocardiography, phonocardiography, echocardiography, cardiac catheterization, and cineangiocardiology). All students are required to meet with one of the instructors prior to enrolling in this course. Weight: 8, 4 (only with special permission of instructors). *Serwer, Armstrong, and Sterba*

PED-232(C). Preventive Cardiology: Clinical Applications. The aim of this course is to introduce clinical application of the current knowledge in preventive cardiology. The course will consist of didactic sessions and clinical case illustration. Topics will include epidemiology of CAD; CAD risk factor modification, such as clinical management of hyperlipidemias, stress management, physical fitness training; as well as the use of new technologies in early diagnosis of CAD and the current status of bypass surgery, etc. Weight: 1. *Kimm and guest speakers*

PED-233(C). Allergy and Clinical Immunology . Clinical evaluation and practice in use and methods of diagnosis and treatment of allergic and immunologic disorders including immunologic deficiency states; and autoimmune disorders. Scope: history, physical examination, skin testing and a variety of clinical immunologic tests. Weight: 4 or 8. *R. Buckley, Sampson, Schiff, Warren and Kredich*

PED-234(C). Clinical Genetics and Metabolism. The student will become familiar with evaluation and management of various genetic disorders, including diagnostic techniques, laboratory methods, and genetic counseling. Experience in internal medicine and prenatal diagnosis is flexible, depending on the interests of the student. May take with BCH-234(B). Weight: 4. *Kahler*

PED-241(C). Pediatric Nephrology. Course is designed to provide experience in diagnosis, interpretations of laboratory tests, natural history, and treatment of acute and chronic disorders of the kidney in children. Students are also exposed to the management of fluid and electrolyte disorders in infants and children. Weight: 4 or 8. *Scheinman*

PED-243(C). Adolescent Medicine. Students will see adolescents in youth clinic on Monday afternoons. Emphasis to be placed on the behavioral and developmental aspects of adolescence, drug abuse, and the pregnant teenager. Tutorial and supervisory time to discuss specific patients and pertinent literature will be arranged. Weight: 2. *Fairchild*

PED-250(C). Advanced General Pediatrics, Duke North Wards. This advanced course is designed to allow student a four-week experience as a subintern. Under supervision of faculty attendings and resident house staff the senior student will assume primary responsibility for the care of children admitted to the Duke inpatient service. Emphasis will be placed on the development of a pathophysiologic approach to the diagnosis and therapy of a broad spectrum of pediatric illnesses. Advanced concepts in pediatrics will be emphasized. Students will rotate night call with resident pediatric house staff. Weight: 4. *Armstrong*

PED-281(C). Pediatric Neurology. Students will examine both hospitalized and ambulatory patients with neurological disorders. Emphasis is placed on the neurological history, examination, and the investigation and management techniques of nervous system disorders of childhood. Weight: 8. *D'Souza*

Pharmacology

Professor Norman Kirshner, Ph.D. (Pennsylvania State, 1952), *Chairman*.

Professors: Mohamed Abou-Donia, Ph.D. (California at Berkeley, 1966); Everett H. Ellinwood, M.D. (North Carolina at Chapel Hill, 1959); Leon Lack, Ph.D. (Columbia, 1953); Daniel B. Menzel, Ph.D. (California at Berkeley, 1962); Elliott Mills, Ph.D. (Columbia, 1964); Athos Ottolenghi, M.D. (Univ. of Pavia, 1946); Saul M. Schanberg, M.D. (Yale, 1964), Ph.D. (Yale, 1961); Theodore Slotkin, Ph.D. (Rochester, 1970); Walter D. Watkins, Ph.D. (Michigan, 1971), M.D. (Colorado, 1975); Pelham Wilder, Ph.D. (Harvard, 1950).

Associate Professors: Thorir D. Bjornsson, M.D. (Univ. of Iceland, 1971); James Norman Davis, M.D. (Cornell, 1965); Laura E. Gutman, M.D. (Stanford, 1962); Cynthia M. Kuhn, Ph.D. (Duke, 1975); Julian Victor Nadler, Ph.D. (Yale, 1972); Gerald M. Rosen, Ph.D. (Clarkson, 1969); Harold C. Strauss, M.D., C.M. (McGill Univ., 1964).

Assistant Professors: Warner M. Burch, Jr., M.D. (Bowman Gray, 1971); James C. Fuchs, M.D. (Johns Hopkins, 1964); James O. McNamara, M.D. (Michigan, 1968); Charles B. Nemeroff, Ph.D. (North Carolina

at Chapel Hill, 1976), M.D. (North Carolina at Chapel Hill, 1981); Stephen C. Strom, Ph.D. (Kansas, 1978); A. Richard Whorton, Ph.D. (Vanderbilt, 1975).

Medical Research Professor: Gertrude Elion, D.Sc. (George Washington, 1969).

Medical Research Associate Professor: Wilkie A. Wilson, Ph.D. (Duke, 1971).

Medical Research Assistant Professors: Jorge Bartolomé, Ph.D. (Univ. of Chile, 1978); Elmer J. Rauckman, Ph.D. (Duke, 1976); Peter G. Smith, Ph.D. (Duke, 1978); Ying-Fu Su, Ph.D. (Colorado, 1978); Steven P. Wilson, Ph.D. (Duke, 1976); Robert L. Wolpert, Ph.D. (Princeton, 1976).

Adjunct Professors: Kwen-jen Chang, Ph.D. (New York at Buffalo, 1972); Pedro Cuatrecasas, M.D. (Washington Univ., 1962); Leon Golberg, D. Sc. (Univ. of Witwatersrand, 1946); Robert A. Neal, Ph.D. (Vanderbilt, 1963); Charles A. Nichol, Ph.D. (Wisconsin, 1949); Vladimir Petrow, D.Sc. (Univ. of London, 1947).

Adjunct Associate Professors: Donald E. Gardner, Ph.D. (Cincinnati, 1971); Humberto Viveros, M.D. (Univ. of Chile, 1962).

Adjunct Assistant Professors: Robert E. Desjardins, M.D. (Loyola, 1971); Christopher Lau, Ph.D. (Duke, 1982).

Emeritus: Frederick Bernheim, Ph.D.

Required Course

PHR-200. Pharmacology: Mode of Action of Drugs. A basic course in pharmacology describing the action of drugs in terms of biochemical and physiological processes, and the rationale for their use in clinical therapy. Four lectures, one clinical correlation and one conference per week. 4 units. *Staff*

Electives

PHR-219(B). Tutorial in Pharmacology. Guided independent study of original literature and/or laboratory experience. Open to all students; required of those electing a preclinical base in the Department of Pharmacology. Weight: 1-8. *Staff*

PHR-256(B). Human Nutrition. Principles of nutrition related to clinical practice. Emphasis will be placed on the essentials of nutrition using human disease states and maturation (reproduction, growth, and aging) as a basis for instruction. Topics will include nutritional requirements during pregnancy, lactation, infancy, and old age; metabolic disorders and diseased states. A major section will include the use of perenteral nutrition in the treatment of cancer. Weight: 3. *Manzel*

PHR-270(B).* Neurobiology I. Also listed as PHS-270(B). Weight: 3. *Moore, Kirschner, Robertson, Corless, and Marchase*

PHR-301(B). Physical Chemistry of Aqueous Solutions. An intensive study of the major topics of aqueous solutions including stoichiometry, chemical equilibrium, elementary thermodynamics, experimental kinetics, and electrochemistry. Practical problem sets and problem review sessions will represent a major portion of the course. Weight: 3. *Wilder*

PHR-330(B). Pharmacological Basis of Clinical Medicine. This course consists of a detailed analysis of the mechanism of action and rationale for use of pharmacologic agents in disease states. Weight 4. *Bjornsson and staff*

PHR-331(B).* Laboratory Methods in Pharmacology. Prerequisites: permission of instructor. Weight: 6. *Staff*

PHR-333(B).* Principles of Pharmacology and Toxicology 1. Drug absorption, distribution, excretion and metabolism, basic and clinical pharmacokinetics, Hansch correlation of structure and activity, stereo-chemistry, and drug action. Weight: 3. *Slotkin and staff*

PHR-334(B).* Principles of Pharmacology and Toxicology 2. Drug receptor theory and its practical applications, pharmacokinetics and pharmacodynamics of toxic substances, mechanisms of toxicity, adverse drug reactions and interactions. Weight: 3. *Rosen and staff*

PHR-354(B). * Mammalian Toxicology. Principles of toxicology as related to man. Emphasis will be placed on the molecular basis for toxicity of chemical and physical agents. Subjects will include metabolism and pharmacokinetics; toxicologic evaluation; pesticides; metals and industrial chemicals, solvent toxicity, food additives and natural toxins; radiation and radioactive materials; mutagenicity, pathology and toxicology, carcinogenicity, teratogenicity, toxicology of the reproductive system; pulmonary toxicology, toxicology of the kidney, liver toxicology and detoxification mechanisms, neurotoxicology, behavioral toxicology; industrial toxicology, toxicology of the blood, toxicology of the eye, social poisons, management of poisoning, epidemiology, risk assessment, and regulatory toxicology. Weight: 4. *Abou-Donia and staff*

PHR-360(B). Neuropharmacology. Seminar-lecture course emphasizing neurotransmitter mechanisms and the mechanism of action of drugs used to modify nervous system function. Material will be drawn from the recent literature. Weight: 3. *Nadler*

PHR-364(B). Neurotoxicology. Adverse effects of drugs and toxicants on the central and peripheral nervous system. Target sites, pathophysiology, and factors affecting toxicity. Experimental methods for detection and screening of neurotoxic chemicals. Screening and assessment of neurotoxicity in people. Weight: 3. *Abou-Donia*

PHR-372(B). Research in Pharmacology. Laboratory investigation in various areas of pharmacology. Credit to be arranged. *Staff*

Physiology

Professor: James B. Duke Professor Edward A. Johnson, M.D. (Univ. of Sheffield, 1953), *Chairman*.

Professors: James B. Duke Professor Jacob J. Blum, Ph.D. (Chicago, 1952); Irving T. Diamond, Ph.D. (Chicago, 1953); John W. Gutknecht, Ph.D. (North Carolina at Chapel Hill, 1963); Frans F. Jobsis, Ph.D. (Michigan, 1958); Peter K. Lauf, M.D. (Univ. of Freiburg, 1960); Melvyn Lieberman, Ph.D. (State Univ. of New York, 1964); Lazaro J. Mandel, Ph.D. (Pennsylvania, 1969); John W. Moore, Ph.D. (Virginia, 1954); Jacqueline A. Reynolds, Ph.D. (Washington Univ., 1963); John V. Salzano, Ph.D. (Iowa, 1956); Knut Schmidt-Nielsen, Dr.Phil. (Copenhagen, 1952); George G. Somjen, M.D. (New Zealand, 1961); Joachim R. Sommer, M.D. (Munich, 1951); Madison S. Spach, M.D. (Duke, 1954); James B. Duke Professor Charles Tanford, Ph.D. (Princeton, 1947).

Associate Professors: Nels C. Anderson, Ph.D. (Purdue, 1964); Peter B. Bennett, Ph.D. (Univ. of Southampton, 1964); Robert P. Erickson, Ph.D. (Brown, 1958); Joseph C. Greenfield, M.D. (Emory, 1956); J. A. Kylstra, M.D. (Leiden, Holland, 1952); Thomas J. McManus, M.D. (Boston, 1955); Elliott Mills, Ph.D. (Columbia, 1964); George M. Padilla, Ph.D. (California at Los Angeles, 1960); Michael K. Reedy, M.D. (Washington, 1973); David W. Schomberg, Ph.D. (Purdue, 1965); Sidney Simon, Ph.D. (Northwestern, 1973); Myron Wolbarsht, Ph.D. (Johns Hopkins, 1958).

Assistant Professors: Page A. W. Anderson, M.D. (Duke, 1963); Enrico M. Camporesi, M.D. (Univ. of Milan, Italy, 1970); Marc G. Caron, Ph.D. (Miami, 1973); Vincent W. Dennis, M.D. (Georgetown, 1966); Marc K. Drezner, M.D. (Pittsburgh, 1970); Stuart Handwerger, M.D. (Maryland, 1964); Jeffrey V. May, Ph.D. (Rhode Island, 1979); J. Scott Rankin, M.D. (Tennessee, 1969); Judith L. Swain, M.D. (California at San Diego, 1974); Andrew G. Wallace, M.D. (Duke, 1959); Andrew Wechsler, M.D. (State Univ. of New York, 1964); William E. Yarger, M.D. (Baylor, 1971).

Medical Research Associate Professors: Michael C. Kohn, Ph.D. (South Carolina, 1969); J. Mailen Kootsey, Ph.D. (Brown, 1966); Avis Sylvia, Ph.D. (North Carolina at Chapel Hill, 1973).

Assistant Medical Research Professors: Norma C. Adragna, Ph.D. (National Univ. of Cordoba, Argentina, 1973); Gilbert Baumann, Dr.Sc. (Swiss Federal Inst. of Tech., 1968); Michael Hines, Ph.D. (Chicago, 1975); Ann LeFurgey, Ph.D. (North Carolina at Chapel Hill, 1976).

Adjunct Associate Professors: Russell Horres, Ph.D. (Duke, 1975); James M. Schooler, Jr., Ph.D. (Wisconsin, 1964).

Adjunct Assistant Professors: Thomas W. Anderson, Ph.D. (Duke, 1971); Reginald D. Carter, Ph.D. (Bowman Gray, 1970); Michael J. Galvin, Jr., Ph.D. (Georgia, 1975); Marcia Goldner, Ph.D. (Duke, 1972); Philip A. McHale, Ph.D. (Duke, 1975).

Required Course

PHS-200. Medical Physiology. Lectures and conferences on cell and organ physiology. Human and medical aspects are stressed in clinical conferences. Required of first-year medical students; limited to other students whose training requires knowledge of human physiology as it pertains to medicine. Five lectures; one conference, small group discussions. Prerequisite: consent of course leader. 5 units. *Padilla and staff*

PHS-201. Basic Neurophysiology. A survey of neurophysiology with emphasis on medical application. Follows PHS-200 in a four-week period in January. Lectures, conferences, demonstrations, clinical presentations. Prerequisite: PHS-200 or equivalent. 2 units. *Somjen and staff*

Electives

PHS-217(B). * Membrane Transport. Basic principles of the transport of water and solutes across biological and model membranes. The course uses physicochemical principles to provide a comprehensive understanding of phenomena such as active and passive transport, energy barriers through membranes, surface effects, and ion selectivity. The methodology and conceptual framework for the study of transport is described with selected examples from bilayers, red blood cells, nerve and epithelia. Physical chemistry is recommended. Weight: 3. *Mandel, Lauf, and Simon*

PHS-219(B). Preceptorship in Physiology. Guided independent study of original literature and/or laboratory experience in physiology. Weight: 1 to 16. *Lauf and staff*

PHS-222(B). Respiratory System in Health and Disease. Primary emphasis is on the physiology of respiration. Topics covered include pulmonary mechanics; gas exchange; ventilation-perfusion relationships; central and peripheral regulation of ventilation; and respiratory responses to exercise, altitude, and hyperbaric environments. Weight: 2. *Salzano and Kylstra*

PHS-260(B). Interactions of Differentiated Cells. This course will cover basic mechanisms underlying cell-to-cell and substrate interactions of eukaryotic cells. It will consist of faculty-led discussions and informal seminars designed to evaluate critically current literature. Mitogenic responses of quiescent cells, hormonal modulation of growth and differentiation, membrane-mediated recognition phenomena in endo- and exocytoses, and the role of Golgi complex in membrane biogenesis and secretory processes are examples of topics to be covered. Weight: 3. *Padilla, Jakoi, Conn, and Vanaman*

PHS-270(B). * Neurobiology. Interdisciplinary approach to neuronal function at the cellular and molecular levels. Topics will include: subcellular structural organization, physiology and pharmacology of excitable membranes, impulse generation and conduction, neurotransmitters, proteins, pre- and postsynaptic organization and function. Weight: 3. *J. W. Moore, Kirshner, Robertson, Corless, and Marchase*

PHS-272(B). * Physiology of the Central Nervous System. Topics include: The central processing of sensory information; motor control, ions, and electric activity in the central nervous system; pathologic changes of function. In part lectures, in part seminar format (reading of original research articles; student presentations). Weight: 2. *Somjen*

PHS-320(B). Gastrointestinal Physiology. In this course the normal physiology, mechanisms of control, and transport characteristics of the human gastrointestinal tract and its associated glands (salivary, pancreas, liver) are presented. The mechanisms of secretion and reabsorption are treated at a cellular level. Clinical examples

are presented to contrast normal function with pathophysiology. Weight: 2. *Mandel, Akwari, and staff*

PHS-321(B).* Renal Physiology. The composition and size of body fluid compartments and the regulation of the constituents of the plasma by the kidney is presented by lectures. Measurements of renal function including renal blood flow, tubular reabsorption and secretion, and acid-base regulation are discussed together with the theory of counter current exchange, ion transport in the kidney and hormonal control of renal function. Weight: 2. *Dennis and staff*

PHS-401(B).* Metabolic Physiology. The control of gluconeogenesis, protein degradation, the storage and mobilization of glycogen and of lipids will be examined both at cellular level (e.g., metabolite compartmentation, futile cycling, enzyme modification) and in terms of interactions between tissues such as liver, kidney, and muscle. Strategies for metabolic adaptation to exercise, cold environment, starvation, obesity, and birth will be discussed. Weight: 3. *Blum*

PHS-411(B). Molecular and Cellular Bases of Differentiation. Emphasis is placed on the biochemistry of the cell surface as the basis of cell recognition, control of cell cycle, and overall tissue organization. An analysis of protein nucleic acid interactions in chromosome structure and function are considered in light of new concepts of transcriptional and translational control. Studies also include nuclear cytoplasmic interactions as well as hormone induction of differentiation and development. The course is designed to study the phenomena of development and differentiation and has been organized on a multidisciplinary level. The course is part of the lecture series of development and differentiation study program, DDS-201(B). Weight: 3-4. *Padilla, McCarty, Counce, and Kaufman*

PHS-418(B).* Reproductive Biology. An in-depth study of male and female reproductive processes including hypothalamic, pituitary, and gonadal control mechanisms as well as the physiology of pregnancy and parturition. Lectures by guest clinical faculty will emphasize the interface between basic science and clinical aspects. The lecture material in each section of the course is followed by seminar presentations which will contribute to ANA/PHS-424, a corequisite for the course. Also listed as ANA-418(B)*. Weight: 2. *N. Anderson, Schomberg, and Tyrey*

PHS-424(B). Reproductive Biology. Selected topics in reproductive biology will be chosen for in-depth reading and analysis in the seminar format. The seminar is to be taken as a corequisite with ANA/PHS 418. (Also listed as Anatomy 424). Weight: 1. *Anderson, Schomberg, and Tyrey*

Psychiatry

Professor: Bernard J. Carroll, B.M., B.S. (Univ. of Melbourne, 1964); Ph.D. (Univ. of Melbourne, 1971), *Chairman*.

DIVISION OF BIOLOGICAL PSYCHIATRY

Professor: Bernard J. Carroll, B.M., B.S. (Univ. of Melbourne, 1964), Ph.D. (Univ. of Melbourne, 1971), *Acting Head of Division*.

Professors: James B. Duke Professor H. Keith H. Brodie, M.D. (Columbia, 1965); Everett H. Ellinwood, Jr., M.D. (North Carolina at Chapel Hill, 1959); C. William Erwin, M.D. (Texas, 1960); Robert L. Green, Jr., M.D. (Hahnemann, 1946); Saul M. Schanberg, M.D., Ph.D. (Yale, 1964); Theodore A. Slotkin, Ph.D. (Rochester, 1970); William K. Zung, M.D. (Texas, 1961).

Clinical Professors: John L. Sullivan, M.D. (Johns Hopkins, 1969); Richard J. Wyatt, M.D. (Johns Hopkins, 1964).

Associate Professors: Jonathan Davidson, M.D. (Univ. Coll., London, 1976); Veli Markku Linnoila, M.D., Ph.D. (Helsinki, 1972); Steve Lipper, M.D. (Boston, 1972); Richard Weiner, M.D., Ph.D. (Duke, 1973).

Assistant Professors: C. Edward Coffey, M.D. (Duke, 1979); Clinton D. Kilts, Ph.D. (Michigan, 1979); Ranga Krishnan, M.D. (Madras Med. Coll., 1978); Daniel C. Sullivan, M.D. (Vermont, 1970).

Adjunct Associate Professor: Jau-Shyon Hong, Ph.D. (Kansas, 1973).
Assistant Medical Research Professors: Garth Bissitte, Ph.D. (North Carolina State, 1982).
Associate: E. Michael Kahn, M.D. (Duke, 1979).
Clinical Associates: George Dougherty, M.D. (Stanford, 1976); Ugo Goetzl, M.D. (New York Med. Coll., 1968).

DIVISION OF CHILD AND ADOLESCENT PSYCHIATRY

Professor: John A. Fowler, M.D. (Bowman Gray, 1946), *Head of Division*.
Visiting Research Professor: Robert Coles, M.D. (Columbia, 1954).
Associate Professors: Harold J. Harris, M.D. (Long Island Med. Coll., 1949); J. David Jones, M.D. (Duke, 1954); Charles R. Keith, M.D. (Harvard, 1961).
Associate Clinical Professor: W. Sam Yancy, M.D. (Duke, 1961).
Assistant Professors: Marcelino Amaya, M.D. (Univ. Nacional Autonoma de Mexico, 1954); William B. Anderson, M.D. (Minnesota, 1948).
Assistant Clinical Professor: Cesar Guajardo, M.D. (Univ. de Nuevo Leon, Mexico, 1961).
Associate: James E. Lee, M.D. (Duke, 1979).
Clinical Associates: Mary E. Berman, M.D. (Michigan, 1977); Thomas C. Cornwall, M.D. (Northwestern, 1970); Lucy T. Davis, Ed.D. (Columbia, 1955); Nancy J. Livingstone, M.D. (Duke, 1972); William Mackey, M.D. (Tennessee, 1969); Daniel T. Matthews, M.D. (Texas at Galveston, 1967); Daphne Rosenblitt, M.D. (Duke, 1974); Donald L. Rosenblitt, M.D. (Duke, 1973); Jean G. Spaulding, M.D. (Duke, 1972).
Instructors: Robert A. Ahmed, M.A. (North Carolina Central, 1982); Alice F. Long, M.A. (Chicago, 1953); Joseph J. Simmons, M.A. (North Carolina Central, 1982).
Clinical Instructor: Etta Leathers, M.E. (North Carolina Central, 1974).

DIVISION OF SOCIAL AND COMMUNITY PSYCHIATRY

Associate Professor: Daniel G. Blazer, M.D., Ph.D. (Vanderbilt, 1969), *Head of Division*.
Professors: Kurt Back, Ph.D. (Massachusetts Inst. of Tech., 1949); James H. Carter, M.D. (Howard, 1966); George L. Maddox, Ph.D. (Michigan, 1956); Frederick T. Melges, M.D. (Columbia, 1961); Erdman B. Palmore, Ph.D. (Columbia, 1959).
Associate Professors: Linda K. George, Ph.D. (Duke, 1975); Jacquelyne J. Jackson, Ph.D. (Ohio, 1960); Charles E. Llewellyn, Jr., M.D. (Med. Coll. of Virginia, 1946).
Associate Clinical Professor: Nicholas Stratas, M.D. (Toronto, 1957).
Assistant Professors: James O. Hoover, M.D. (Iowa, 1966); David Larson, M.D. (Temple, 1973); Kenneth Rockwell, M.D. (Duke, 1961).
Assistant Clinical Professors: Soong Lee, M.D. (Seoul, 1963); Khalil Tanas, M.D. (American Univ., Beirut, 1972);
Associates: Jane Clark Moorman, M.S.W. (Tulane, 1971); Marvin S. Swartz, M.D. (Tufts, 1980).
Clinical Associates: Lesley Braasch, M.D. (New York, 1970); Jeffrey Brantley, M.D. (North Carolina at Chapel Hill, 1977); Mark D. Glenn, M.D. (North Carolina at Chapel Hill, 1979); Sally Johnson, M.D. (Jefferson, 1976).
Instructor: Frantz Hershey, M.Ed. (Virginia, 1974).
Clinical Instructors: Peter H. Holden, M.D. (Univ. of Sheffield, 1948); Richard K. Kull, M.D. (Duke, 1977); Mary Lou Melville, M.D. (Texas, 1971); James A. Smith III, M.D. (Howard, 1976); David R. Talley, M.D. (California at Berkeley, 1980).
Research Associates: James R. Bachar, Ph.D. (Pittsburgh, 1969); Gerda Fillenbaum, Ph.D., (London, 1966); Richard Landerman, Ph.D. (Duke, 1978); Kathleen Jordan, M.A. (Duke, 1977); Connie Service, M.P.H. (North Carolina at Chapel Hill, 1979).

DIVISION OF INPATIENT SERVICES

Professor: Bernard J. Carroll, B.M., B.S. (Univ. of Melbourne, 1964), Ph.D. (Univ. of Melbourne, 1971), *Acting Head of Division*.
Professors: Frederick R. Hine, M.D. (Yale, 1949); Peter T. Loosen, M.D. (Univ. of Munich, 1970); John M. Rhoads, M.D. (Temple, 1943).
Clinical Associate Professor: Pedro J. Irigaray, M.D., (Univ. Nacional Autonoma de Mexico, 1955).
Assistant Professors: Allen Dyer, M.D. (Duke, 1972); Elliott B. Hammett, M.D. (Duke, 1966); Z. Daniel Pauk, M.D. (Iowa, 1956).
Assistant Clinical Professors: Jack W. Bonner III, M.D. (Southwestern, 1965); George W. Doss, M.D. (Southwestern, 1954); Christine Machemer, M.D. (Univ. of Freiburg, 1959); Eric Peterson, M.D. (Duke, 1971); Ingrid B. Pisetsky, M.D. (Albert Einstein, 1971); Richard O. Poe, M.D. (Harvard, 1958); Richard Selman, M.D. (Emory, 1972); William J. Shamblin, M.D. (Alabama, 1971); Cynia B. Shimm, M.D. (Yale, 1950); William Taylor, M.D. (Med. Coll. of Virginia, 1959); Ervin Thompson, M.D. (Vanderbilt, 1972).
Associate in Psychiatric Recreation Therapy: Barbara A. Yoder, M.S. (Florida, 1970).

Clinical Associates: Joseph M. Cools, M.D. (Michigan, 1979); Joanna Gaworowski, M.D. (Med. Academy, Warsaw, Poland, 1967); Ernest Raba, M.D. (Texas, 1972); C. Phillip Stevenson, M.D. (South Carolina, 1978).

Clinical Associate Psychiatric Nursing: Patricia Webster, M.S.N. (North Carolina at Chapel Hill, 1976).

Geropsychiatry

J. P. Gibbons Professor: Ewald W. Busse, M.D. (Washington Univ., 1942).

Professors: Daniel T. Gianturco, M.D. (Buffalo, 1960); Adriaan Verwoerd, M.D. (Med. School of Amsterdam, 1952); Hsio-shan Wang, M.D. (National Taiwan Univ., 1953); Alan D. Whanger, M.D. (Duke, 1956).

DIVISION OF MEDICAL PSYCHOLOGY

Associate Professor: Robert J. Thompson, Ph.D. (North Dakota, 1971), *Head of Division*.

Professors: Irving A. Alexander, Ph.D. (Princeton, 1949); Robert C. Carson, Ph.D. (Northwestern, 1957); Edward Clifford, Ph.D. (Minnesota, 1957); Herbert F. Crovitz, Ph.D. (Duke, 1970); Susan Schiffman, Ph.D. (Duke, 1970); Richard Surwit, Ph.D. (McGill, 1972); Jay M. Weiss, Ph.D. (Yale, 1967).

Clinical Professor: Darwin Darr, Ph.D. (Florida State, 1969).

Adjunct Professor: Florence Kaslow, Ph.D. (Bryn Mawr, 1969).

Associate Professors: Elaine K. Crovitz, Ph.D. (Duke, 1964); Patrick Logue, Ph.D. (North Dakota, 1965); Gail R. Marsh, Ph.D. (Iowa, 1968); Robert Shipley, Ph.D. (Michigan State, 1972); Derek Shows, Ph.D. (Duke, 1967); Ilene Siegler, Ph.D. (Duke, 1974).

Adjunct Associate Professors: Lenore Behar, Ph.D. (Duke, 1973); Paul T. Costa, Jr. Ph.D. (Chicago, 1970).

Assistant Professors: James Blumenthal, Ph.D. (Washington, 1975); John Curry, Ph.D. (Catholic Univ., 1978); Steven Herman, Ph.D. (Duke, 1977); Mary M. Huse, Ph.D. (Duke, 1959); Francis Keefe, Ph.D. (Ohio, 1975); John E. Lochman, Ph.D. (Connecticut, 1976); Carole S. Orleans, Ph.D. (Maryland, 1977); Craig R. Stenberg, Ph.D. (Colorado, 1982); Anna L. Stout, Ph.D. (South Carolina, 1980); Russell F. Tomlinson, Ph.D. (Florida, 1957).

Assistant Clinical Professors: John Barrow, Ph.D. (Houston, 1971); Tracey Potts Carson, Ph.D. (Georgia, 1982); Jack Edinger, Ph.D. (Virginia Commonwealth, 1971); Mark Feinglos, M.D. (McGill, 1973); Richard A. Lucas, Ph.D. (North Carolina at Chapel Hill, 1972); Ronette L. Klotkin, Ph.D. (Minnesota, 1978).

Assistant Medical Research Professors: Ralph Cooper, Ph.D. (Rutgers, 1973); James Lane, Ph.D. (California at Los Angeles, 1979); David Madden, Ph.D. (California at Davis, 1977).

Adjunct Assistant Professors: John Barefoot, Ph.D. (North Carolina at Chapel Hill, 1968); Brad Fisher, Ph.D. (Alabama, 1976); Sandra Funk, Ph.D. (North Carolina at Chapel Hill, 1976); James A. Green, Ph.D. (North Carolina at Chapel Hill, 1979); Pamela Trent, Ph.D. (Northwestern, 1975).

Clinical Associates: Hendey Buckley, Ph.D. (Duke, 1980); James E. Byassee, Ph.D. (Louisville, 1975); Henry Roth, Ph.D. (Duke, 1977); Thomas Stearns, Ph.D. (Florida State, 1980); Joseph E. Talley, Ph.D. (Virginia, 1977).

Instructors: Joseph Kertesz, M.A. (Michigan, 1973); Louise B. Lampron, Ph.D. (Tennessee, 1983); Jennifer McDowell, Ph.D. (George Peabody, 1981); Elaine Revis, M.A. (Case Western Reserve, 1981); Carla M. Weinfeld, M.S.W. (North Carolina at Chapel Hill, 1982).

Clinical Instructor: Steven Weincrot, Ph.D. (Denver, 1979).

Research Associates: Miriam Clifford, Ph.D. (Duke, 1970); James Moore, Ph.D. (Houston, 1977); Judy K. Plemons, Ph.D. (Pennsylvania State, 1981); Frederick A. Schmidt, Ph.D. (Ohio, 1982).

DIVISION OF OUTPATIENT SERVICES

Professor: Jesse O. Cavenar, Jr., M.D. (Arkansas, 1963), *Head of Division*.

Professor: David S. Werman, M.D. (Lausanne, Switzerland, 1952).

Associate Professor: David M. Hawkins, M.D. (Duke, 1966).

Assistant Professors: Ronald Taska, M.D. (Baylor, 1973); John I. Walker, M.D. (Texas at Galveston, 1970).

Associate Professor of Psychiatric Nursing: Eleanor M. White, M.S. (Oregon, 1963).

Assistant Clinical Professors: Martin G. Groder, M.D. (Columbia, 1964); Leroy B. Lamm, M.D. (Bowman Gray, 1946); Robert D. Phillips, M.D. (Pennsylvania, 1952); Karl W. Stevenson, M.D. (Bowman Gray, 1966).

Associates: Harold S. Kudler, M.D. (New York, 1979); Steve Mahorney, M.D. (Louisiana, 1973).

Clinical Associates: Peter F. Adland, M.D. (Georgetown, 1975); Ernest R. Braasch, M.D. (State Univ. of New York, 1970); Lawrence Champion, M.D. (Wisconsin, 1973); Frank B. Miller, M.D. (Michigan, 1974); Peter Z. Perault, M.D. (Vermont, 1977); James S. Wells, Jr., M.D. (North Carolina at Chapel Hill, 1977).

Clinical Instructor: Thomas Stephenson, M.D. (Michigan, 1972).

DIVISION OF PSYCHOSOMATIC MEDICINE

Professors: Joseph B. Parker, Jr., M.D. (Tennessee, 1941); Redford B. Williams, Jr., M.D. (Yale, 1967).
Associate Professors: Marianne S. Breslin, M.D. (Medical Academy, Duesseldorf, Germany, 1946); Allan A. Maltbie, M.D. (Emory, 1969).
Associate Clinical Professor: Harold R. Silberman, M.D. (Washington Univ., 1956).
Assistant Professor: Randal France, M.D. (Texas at Galveston, 1973).
Assistant Clinical Professors: Conrad Fulkerson, M.D. (Missouri, 1969); James T. Moore, M.D. (Missouri, 1971); Patricia A. Ziel, M.D. (Michigan, 1968).
Medical Research Assistant Professor: Patricia Cotanch, Ph.D. (Pittsburgh, 1979).
Associates: Douglas H. Finestone, M.D. (Med. Coll. of Virginia, 1979); Michael Volow, M.D. (Seton Hall, 1964).
Clinical Associates: Elizabeth H. King, M.D. (Duke, 1958); Bruce Neeley, M.D. (Med. Coll. of South Carolina, 1975); Linda H. Rubin, M.P.H. (North Carolina at Chapel Hill, 1978); Indira Varia, M.D. (Shah Med. Coll., India, 1968); James Weiss, M.D. (Louisiana, 1973); Robert Winton, M.D. (Vanderbilt, 1972).

DIVISION OF PSYCHIATRIC SOCIAL WORK

Associates: Hallie M. Coppedge, M.S.W. (North Carolina at Chapel Hill, 1948); Maxine R. Flowers, M.S.W. (Columbia, 1964); Stephen Hawthorne, M.S.W. (California, 1974).
Clinical Associates: Camille S. Arrington, M.S.W. (North Carolina at Chapel Hill, 1982); Bess Autry, M.S.W. (North Carolina at Chapel Hill, 1976); Mary A. Black, M.S.W. (North Carolina at Chapel Hill, 1970); Mary Jane Burns, M.S.W. (North Carolina at Chapel Hill, 1974); Barbara Denny, M.S.W. (North Carolina at Chapel Hill, 1975); Muki Fairchild, M.S.W. (North Carolina at Chapel Hill, 1976); William Fraker, M.S.W. (Pennsylvania, 1979); Lisa Gwyther, M.S.W. (Case Western Reserve, 1969); Mary Gail Holton, M.S.W. (Richmond Professional Institute, 1966); Gail McLeod, M.S.W. (North Carolina at Chapel Hill, 1971); Gail McNeil, M.S.W. (North Carolina at Chapel Hill, 1974); William S. Meyer, M.S.W. (Illinois, 1977); Betty B. Parham, M.S.W. (Smith, 1971); Anne K. Parrish, M.S.W. (North Carolina at Chapel Hill, 1963); Joye Pursell, M.S.W. (North Carolina at Chapel Hill, 1978); Elinor Roy, M.S.W. (North Carolina at Chapel Hill, 1977); Carolyn Thornton, M.S.W. (North Carolina at Chapel Hill, 1968); Margaret Wilner, M.S.W. (Columbia, 1977).
Clinical Instructors: Christine Bell, M.S.W. (North Carolina at Chapel Hill, 1977); Christine Erskine, M.S.W. (North Carolina at Chapel Hill, 1980); Lisa Gilland, M.S.W. (North Carolina at Chapel Hill, 1978); Judith Herman, M.S.W. (North Carolina at Chapel Hill, 1983); Nyra Hill, M.S.W. (North Carolina at Chapel Hill, 1978); Robert Laws, M.S.W. (North Carolina at Chapel Hill, 1978); Mary Pat Lennon, M.S.W. (Catholic Univ., 1978); Amanda Mathis, M.S.W. (North Carolina at Chapel Hill, 1978); Lois Perlman Minis, M.S.W. (North Carolina at Chapel Hill, 1981); Irene Moore, M.S.W., (Tennessee, 1982); Andrew S. Silberman, M.S.W. (North Carolina at Chapel Hill, 1982).
Emeriti: Marie Baldwin, M.D.; S. Kathryn Barclay, M.S.W.; Bingham Dai, Ph.D.; Ila H. Gehman, Ed.D.; Dorothy K. Heyman, M.S.W.; Maurine B. LaBarre, M.S.W.; Joseph B. Parker, M.D.; Martha L. Wertz, M.S.W.; William P. Wilson, M.D.

Required Courses

PSC-200. Consists of sixty hours devoted to human behavior. An amphitheater demonstration series introduces the student to the behavioral science issues relevant to medicine. Discussants from the fields of behavioral neurobiology, psychology, psychiatry, and sociology discuss various areas of behavior function from the points of view of the several scientific disciplines. Functional and developmental points of view are presented and stages in the development of the individual personality are traced. Concurrently, a series of small group meetings provide opportunities for additional assimilation of theoretical material and its application with specific examples of behavior through interviews of patients and group discussion. The small groups also provide opportunities to introduce effective techniques of human interviewing and interaction together with observation of the primary data of human behavior. Both didactic and small group portions of the course stress relevance of human behavior to the biological and psychological aspects of medicine.

PSC-205. Required during the second year—is an eight-week clerkship in clinical psychiatry. The student assumes limited responsibility, under supervision, for diagnosis and treatment of patients on the psychiatric wards, psychiatric outpatient clinic, and psychosomatic consultation services on nonpsychiatric wards of the hospital. Supervision is directed toward the application of concepts of diagnosis, psy-

chopathological formulation, and therapy. These concepts are taken from descriptive, biological, psychoanalytic, and psychosocial contributions to current psychiatric thought. Supervision is also provided to develop interpersonal techniques of sensitive observation and therapeutic use of self. Emphasis is placed upon concepts and techniques applicable to all patients as well as psychiatric patients. To this end student interviews with patients on the nonpsychiatric services are reviewed with a psychiatric supervisor. Didactic instruction includes seminars on symptomatic, characterological, and psychophysiological neurotic conditions; the major psychoses; psychiatric problems of childhood; adolescence and late life; drug and somatic therapies; the psychotherapies; and introductory electroencephalography. In addition to rounds and case conferences, students are encouraged to observe psychotherapy and to participate in supervised psychological treatment whenever appropriate situations can be provided.

Electives

PSC-210(B).† Philosophy of Science and Behavioral Sciences. A reading-discussion seminar reviewing the traditional (logical empiricist) view of scientific knowledge and method followed by consideration of recent developments of thought suggesting additions and modifications to that view. Implications for the behavioral sciences in medicine are emphasized. Weight: 1. *Hine*

PSC-213(B).† Human Development I: Birth to Adolescence. This course is a survey of the psychological development of the child from birth through adolescence. The first segment of the course is designed to provide the student with an awareness of some of the major theoretical orientations to child development including the psychoanalytic, Piagetian, and social learning positions. This is followed by a systematic study of the normal sequences of child development, focusing in particular on some of the major events in the cognitive, social, and emotional life of the child. The course is run in seminar fashion utilizing numerous theoretical and research papers as well as observation of children in naturalistic settings to facilitate class discussion. Students will also be required to familiarize themselves with research in child development by doing a review of the literature in a defined area. Weight: 2. *Curry*

PSC-214(B).† Human Development II: The Later Years of Life. This course will cover the basic research material in the psychology of adult development and aging with an emphasis on such topics as personality development, intellectual development, learning and memory, family and social processes, health and behavior, and research methods. Additionally, the use of research and knowledge base in geriatric medicine and in geriatric psychiatry, with a focus on understanding normal development in mid-life and old age, will be discussed. The course will be taught as a seminar. There will be assigned readings on reserve at the library and a recommended text. Students will be required to review the literature in an area of their choice, prepare an annotated bibliography, and have an oral examination on the topic. Weight: 2. *Siegler*

PSC-215(B).† Comparative Personality Theory. An examination of models of human functioning; topics will include examples from psychoanalytic, interpersonal, humanistic, behavioristic, and existential approaches with the goal of recognizing personality issues that may arise within the framework of the doctor-patient relationship. A paper covering empirical approaches is required. Term: Spring 1. Weight: 1. *Crovitz*

†For further information, contact the Associate Dean for Graduate Medical Education.

PSC-217(B).† Interpersonal Relationships. Theoretical and empirical models of interpersonal relationships will be examined, with emphasis upon the changing, developmental stages of interpersonal relationships. Research in marital and family systems and in physician-patient dyads will be critically discussed. Weight: 1. *Lochman*

PSC-223(B).† Neurobiological Basis of Behavior. The course surveys neuroanatomical, neurophysiological, neurochemical, and neuropharmacological evidence of central nervous system function as it relates to normal and abnormal behavior. Clinical description, measurement of function, as well as the biological substrates of affective disorders and psychoses, will be emphasized. Scientific bases of current therapeutic procedures, especially psychopharmacological, will be examined. Course format consists of assigned readings, study questions, lectures by faculty, and other active researchers. Mid-term and final examinations are given. Additionally, students will have an opportunity to become acquainted with and to participate in ongoing research. Weight: 4. *Ellinwood, Dougherty, Cant, Carroll, Cooper, Davidson, Erwin, Kilts, Linn, Logue, Loosen, Marsh, Nemeroff, Taska, and Hong*

PSC-238(B).†† Psychophysiology. The first half of the course is devoted to lecture presentations covering the major topics in psychophysiology. The topics receiving a major emphasis are cognition, attention, emotional states, EEG, evoked potentials, skin potential, heart rate, and muscle tension. The second half of the course is devoted to seminar style presentations by the students on topics of their choice and to demonstrations and experiments carried out in the laboratory. A midterm and final exam along with a term paper determine the grade. Weight: 3. *Marsh*

PSC-293(B).† Behavioral Medicine. The theory and application of behavior therapy and behavior modification as applied to the treatment of disease will be discussed. The course will focus on the direct behavioral manipulation of pathophysiology, using biofeedback, relaxation and other self-control techniques. Attention will be focused on the treatment of headaches, cardiovascular disorders, neuromuscular disorders, chronic pain, and stress-related gastrointestinal disease. Both didactic presentation and case material will be used. Students will be expected to spend at least two hours per week seeing patients and rounding with staff. Weight: 2. *Surwit, Blumenthal, and Keefe*

PSC-297(B). Comparative Health Patterns of American Minorities. Comparison of health attitudes and behaviors of minorities in the United States through literature and experiential review, and a concentration on the impacts of sociocultural and socioeconomic factors on those health patterns. Weight 2-8. *Jackson*

PSC-299(B).† Preceptorship in Neurobiology and/or Behavioral Science. Opportunity for the student to work closely with a member of the faculty in an area of mutual interest, with emphasis upon research. (See biobehavioral study program for partial list of interest areas; more complete descriptions available.) Weight: 1-8. *Ellinwood and staff*

PSC-303(B).† Developmental Disabilities. The course will focus on several disorders illustrative of the field, such as retardation, autism and learning disabilities as well as broader issues relating to evolving approaches at diagnosis, remediation, and prevention. The objectives are to present what is known about the etiology and course of developmental disabilities as well as an appreciation of management issues. Weight: 2. *Thompson*

PSC-305(B).† Social and Cultural Aspects of Illness. Seminar on medical-social roles in community and hospital. Topics include physician-patient relationship; epidemiology of illness and health services in terms of ecology, social stratification, race, deviance, and life cycle. Proposals for improving health services are examined.

Students prepare and present to the seminar a term paper on a topic of their choice. Students wishing further work in one particular topic such as black sub-culture or gerontology, should take PSC-299(B) specifying particular interest. May be taken in conjunction with PSC-251(C). Weight: 3. *Palmore and Maddox*

PSC-227(C). Behavioral Aspects of Pediatrics. This course will offer trainees the opportunity to work as a part of an interdisciplinary team in diagnosing and treating children and adolescents (ages two to twenty-one) with a variety of psychiatric and psychosocial problems. Presenting problems might include a full spectrum of childhood and adolescent disorders: anorexia nervosa, bulimia, enuresis, encopresis, school phobia, psychosomatic disorders, tourette syndrome, suicidal and acting-out adolescents, chronically or terminally ill children and child abuse and neglect cases. Trainees will be taught and will clinically apply principles of child and adolescent development and psychoanalytic and family systems theory. The trainee will be involved in child, parent, and family interviews and treatment and will function as an integral part of the treatment team to experientially learn about the diagnosis and treatment of a wide variety of child and adolescent disorders. There will be an opportunity to be involved in the inpatient and outpatient treatment process on pediatric and adolescent psychiatric wards. (See also PED-227(C).) Weight: 2-6. *Jones, Lee, Yancy, and Mrs. Burns*

PSC-234(C). Clinical and Experimental Psychopharmacology. Experience in one or more areas of psychopharmacology including clinical use of drugs, human experimental psychopharmacology and animal neuropharmacology. Lectures covering drug metabolism; mechanisms of action; drug-to-drug interaction; use of animal models for screening psychotropic compounds; animal models of psychosis; neurochemical, behavioral, and electrophysiological effects of drugs during acute and chronic administration; FDA guidelines for conduction of clinical drug trials; biometric approach to ratings of psychopathology; statistical models and computer analysis techniques. Weight: 4. *Zung and Ellinwood*

PSC-240(C). Inpatient Psychiatry. This course is an intensive clinical experience in the diagnosis and treatment of severe and incapacitating psychiatric disorders. The student will be given more clinical responsibility than the comparable second year inpatient rotation. Patient care responsibilities will include management of ward milieu. Treatment approaches emphasizing psychotherapeutic medication, individual and group psychotherapy will be part of the clinical experience. Participation at selected patient care conferences and didactic lectures is expected. The rotation is available at Duke and the VA. The rotation at the VA will include admission decision-making. This experience can be structured to include a survey of the variety of residential treatment available in this area. If desired a student may arrange for a special reading tutorial in related topics (e.g. schizophrenia). Weight: 8-6-3. *Cavenar and Pauk*

PSC-241(C). Clinical Management of Psychiatric Inpatients. Students will develop their skills and knowledge in caring for hospitalized psychiatric patients by performing a subinternship role with close faculty supervision. They will learn treatment of major psychiatric illness by taking primary responsibility for approximately eight patients per month. Weight: 4 or 9. *Poe*

PSC-243(C). Principles and Practice of Outpatient Psychiatry. Training and experience in recognizing and treating emotional disorders in outpatients. Supervised experience with patients having emotional problems commonly seen in medical practice. Training to include theory and techniques of brief psychotherapy, crisis intervention, supportive psychotherapy, and utilization of community resources, both at Duke Hospital and neighboring agencies. The student will be given more clinical responsibility than the comparable second-year outpatient rotation. Because

of the nature of outpatient work it is suggested that the student take the longer (8 weeks) rather than the shorter rotation. Weight: 3-8. *Hawkins, Weiss, Werman, and staff*

PSC-245(C). Psychosomatic Medicine. The consultation-liaison services at the Duke Medical Center and the VA Hospital offer clinical clerkships in the psychological management of medical patients. At Duke Hospital, the student does consultations to the various medical and surgical services under the supervision of residents and staff. Emphasis is placed on training the student in interviewing, assessing, and intervening with patients who are depressed, hypochondriacal, responding emotionally to illness, or have conversion symptoms. At the VA Hospital opportunities are available to work with selected staff people on the emotional aspects of the disease process through surgical and medical liaison consultations. Students can select specific areas of interest which include emotional aspects of cardiac disease, intensive care, death and dying, orthopaedics, and pain. Weight: 8. *Breslin, Volow, Maltbie, France, and Williams*

PSC-247(C). Clinical Psychiatry in Primary Care. This is a four or eight-week subinternship experience on the CMSU. The student will attend clinical rounds with the senior staff; participate in treatment team planning; and engage several patients in brief psychotherapy (under supervision). The course teaches office management of psychosomatic disorders. Coping with the stress of medical practice will be emphasized. Weight: 4-8. *Walker, Brown, and Blumenthal*

PSC-251(C). Community Psychiatry. The student will develop a course based on selections from a variety of community and special population settings; this includes the Durham Mental Health Center and its component units (children's services, alcohol and drug abuse and dependency treatment programs, programs for the care and training of the mentally retarded and adult psychiatry services); the Federal Corrections Center at Butner, and the psychiatric service at the Lincoln Community Health Center. Students interested in this elective must contact Dr. Llewellyn, Dr. Blazer or Dr. James Carter at least four weeks prior to the term selected for this course in order to develop a program tailored to the student's interests. Weight: 4-8. *Llewellyn, Blazer, Carter, and staff of Division of Social and Community Psychiatry*

PSC-253(C). Group Psychotherapy. Observation of an on-going outpatient group psychotherapy program. Weight: 1. *Hawkins and staff*

PSC-255(C). Marriage Counseling in Medical Practice. Basic concepts of the marital relationship and the fundamentals of recognizing, evaluating, and counseling patients with marital problems will be taught. The orientation will be for the physician delivering primary care. References to the literature will be discussed, and a bibliography will be supplied; community resources for marriage counseling will be described; and students will be expected to present case material for discussion during class sessions. Weight: 1. *Llewellyn and Breslin*

PSC-259(C). Clinical Electroencephalography. This course exposes the student to the various uses of electrophysiologic techniques in psychiatric and neurologic research and diagnostic procedures in addition to monitoring neural function during surgical procedures. Electroencephalography and evoked potential recordings are the primary modalities. The student will participate in didactic instructions, supervised interpretative sessions, and observe surgical monitoring. Weight: 2. *Erwin, Wilson, Volow, and Weiner*

PSC-260(C). Psychiatric Aspects of Organic Brain Disease. This eight week elective presents the clinical and behavioral aspects of organic brain conditions at the interface between psychiatry and neurology: epilepsy, narcolepsy, sleep apnea, varied dementias, and organic personality syndromes such as frontal lobe syndrome.

In the three credit curriculum, the student will learn a multidisciplinary clinical approach integrating psychiatric and neurologic observations with bedside neuropsychological observations, and will become more aware of the role of more formal neuropsychological testing. Clinical material will be drawn from the Epilepsy Center, Neurology Service, and Psychiatric Service of the Durham VA Medical Center in the setting of the Durham VA Psychiatric Consultation Service. A fourth credit is available for training in the use of electroencephalograms. Weight: 3 or 4. *Volow and Logue*

PSC-261(C). Clinical Psychology. The goal of this course is to help the student determine the relevance of psychological factors in the etiology and management of common medical problems. The course will introduce the student to psychological assessment techniques. Students will gain familiarity with the potential utility of these tests in medical practice by both observation and practice in their administration and interpretation. Students who are interested in medical problems such as cognitive impairment, low back pain, headache, or cardiac disease may elect to concentrate their efforts in a specific area. Weight: 1. *Huse and staff*

PSC-263(C). Treatment of Anorexia Nervosa and Bulimia. The purpose of this course is to train students in recognizing and treating anorexia nervosa and bulimia. The experience is offered in a multimodel treatment setting and includes: participation in inpatient team meetings, individual psychotherapy sessions with inpatients, observation of family sessions, and participation in outpatient support groups. Weight: 4-8. *Rockwell and Ellinwood*

PSC-265(C). Inpatient Adolescent and Family Psychiatry. Adolescent and family psychopathology are emphasized in the full-time clinical rotation. The experience offered is an intensive and rich one with opportunities to observe and treat patients and their families. Group and individual supervision, collaboration with milieu team members and diagnostic and treatment conferences are heavily emphasized. Weight: 8. *Guajardo*

PSC-266(C). Clinical Management of Adolescent Inpatients. This course consists of well supervised, clinical care for adolescents with various psychopathologic disorders. Each student will be an integral member of the clinical team, with opportunities for participating in individual and group psychotherapy as well as family therapy and parent counseling. A senior staff psychiatrist will be assigned as a preceptor. Weight: 4-8. *Anderson and Curry*

PSC-267(C). Clinical Child Psychiatry Outpatients Programs. Under supervision, the student will perform diagnostic evaluations and short-term treatment with parents, children and families, and may participate in one or more of the following specialty programs: (a) therapeutic kindergarten and elementary school; (b) juvenile court clinic; (c) conduct disorder clinic. Child development and the psychobiological and psychodynamic perspectives of childhood psychopathology will be emphasized. Weight: 3-6. *Harris, Keith, Lochman, and Flowers*

PSC-268(C). Psychosocial Aspects of Medical Illness. Seminars and supervised clinical experiences on the medical wards and clinics will be used to provide the student with knowledge of basic principles and practical clinical skills relevant to determining the role of psychosocial factors in the etiology and course of physical disease in man. This course must be taken in conjunction with a clinical rotation that includes ongoing responsibilities for patient care. Also listed as MED-268(C). Weight: 2. *Williams*

PSC-273(C). The Ideal Physician. The elective will explore, from the perspectives of history and ethics, the concept of the ideal physician in relation to such figures as Hippocrates, Osler, and others as well as students' and patients' conceptions of

what a physician should be, technician and/or humanist. Weight: 1-2. *Dyer and medical history staff*

PSC-274(C). The Ideal Patient. This elective will focus, using the disciplines of history and ethics, on the physician's relationship with the patient and how to deal with patients' expectations of what medicine has to offer. Topics highlighted will include the growth of medical technology, concepts of disease, psychosomatic medicine, and the medicalization of life. Weight: 1-2. *Dyer and medical history staff*

PSC-333 (C). Family Psychiatry and the Therapeutic Community: Durham County General Hospital. Students will evaluate and treat patients within a family-oriented therapeutic community. The principles and practice of psychiatric diagnosis and treatment in a community setting will be stressed. Advanced students will participate in family therapy, group therapy, and the total management of the patient. Weight: 8. *Melges and Thompson*

PSC-335(C). Research Preceptorship in Clinical Psychiatry. This course allows the student to work on a research project in clinical psychiatry with selected members of the psychiatric staff. Weight: 3-8. *Gianturco. Clinical staff by arrangement*

PSC-336(C). Biology of Depression. This elective will focus on the diagnostic, nosologic, treatment and research aspects of depression in adult and late life. The student will be delegated clinical responsibility, and he/she will be closely involved with the treatment team of the affective disorders specialty clinic. Participation at team meetings and diagnostic conferences is expected. Weight: 4-8. *Carroll, Loosen, Nemeroff, Krishnan, Blazer, and Lyles*

PSC-337(C). Geriatric Psychiatry. The medical and clinical aspects of geriatric psychiatry with emphasis on diagnosis and management of geriatric patients in a variety of treatment facilities. Course includes attendance at scheduled conferences and supervised review of geriatric literature. Course may be taken in conjunction with PSC-214(B). Weight: 3-8. *Verwoerd, Whanger, Blazer, Wang, and staff*

PSC-339(C). Preceptorships in Clinical Psychiatry. An advanced training program in the preceptorship style for the recognition, diagnosis, prognosis, and treatment of psychiatric disorders. Experience will be mainly with inpatients and patients seen in consultation from other services but may include outpatients as well. Weight: 3-8. *Gianturco. Clinical staff by arrangement*

PSC-343(C). Clinical Aspects of Alcohol and Drug Abuse. This course offers a part-time or full-time experience on the Durham VA Hospital inpatient service in the diagnosis, treatment, and discharge planning for patients who abuse alcohol and/or drugs. The interrelations of substance abuse with personality disorder and major psychiatric disorder is emphasized. Weight: 4-8. *Cavenar and clinical staff*

PSC-353(C). Correctional-Forensic Psychiatry—Adult and Adolescent. Part-time or full-time experience in a correctional setting is offered. Diagnosis and treatment of adult and adolescent offenders with a variety of medical illnesses and behavioral disturbances are recognized. Elements of forensic psychiatry are stressed where appropriate. Supervision is provided by Duke and University of North Carolina faculty and the Central Prison Hospital and mental health staff. Opportunities for participation in a wide range of original and continuing research are available. Weight: 2-9. *Carter (Duke), Smith (Central Prison), and Rollins (Dorothea Dix)*

PSC-355(C). Clinical Experience in Psychotherapy. This course provides supervised instruction in the long-term care of patients with emotional illness. The student will undertake the psychotherapy of a patient under the direction of a member of the psychiatric faculty. The arrangement with the psychiatric supervisor should

be discussed and confirmed with the fourth year clinical departmental professional adviser in psychiatry. Weight: 1-3. *Gianturco and staff*

PSC-357(C). Behavioral Medicine: Behavioral Treatment of Disease. This course is designed to acquaint the student with behavioral treatment approaches which have proved useful in management of many medical problems. Students will be involved in evaluation and treatment of patients with somatic and psychiatric disorders. Treatment will consist of behavioral modification approaches with particular emphasis on biofeedback. Weight: 1. *Surwit, Keefe, and Blumenthal*

PSC-400(C). Geriatric Medicine. This elective is offered by the interdepartmental faculty of the Division of Geriatric Medicine. The student will work with faculty, fellows, and house staff in a number of settings involved in the care of the geriatric patient. These will include the Geriatric Evaluation and Treatment Clinic (Duke), Geriatric Evaluation Unit and Clinic (Veterans Administration Medical Center), geriatric consultation services (Veterans Administration Medical Center, Durham County General Hospital, and Duke), nursing home facilities, interactions with community services (Coordinating Council for Senior Citizens), home assessment, and others. Principles to be stressed will be biology and pathophysiology of aging; multiple clinical problems in the elderly; interdisciplinary team approach to evaluation, planning, and treatment; goals of maximal functional achievement and independence for the elderly. The student will participate actively in the workup and management of patients in both inpatient and outpatient settings as well as become more familiar with the problems of the elderly in the community. Familiarity with the growing literature in geriatric medicine will be encouraged and the student will participate in seminars, lectures, and team meetings at the appropriate sites including the Duke Center for the Study of Aging. Weight: 4 or 8. *Becker, Cohen, Duvic, Lyles, Moore, Neish, Schmechel, Simpson, Sullivan, Sweeney, and Warshaw*

Radiology

James B. Duke Professor: Charles E. Putman, M.D. (Texas, 1967), *Chairman*.

DIVISION OF IMAGING

Professor: Carl E. Ravin, M.D. (Cornell, 1968), *Director*.

Professors: James T.T. Chen, M.D. (Natl. Defense Med. Ctr., Taiwan, 1950); R. Edward Coleman, M.D. (Washington Univ., 1968); Burton P. Drayer, M.D. (Illinois, 1971); N. Reed Dunnick, M.D. (Cornell, 1969); Eric L. Effmann, M.D. (Indiana, 1967); Herman Grossman, M.D. (Columbia, 1953); E. Ralph Heinz, M.D. (Pennsylvania, 1955); Donald R. Kirks, M.D. (Missouri, 1968); Reed P. Rice, M.D. (Indiana, 1955); Leonard D. Spicer, M.D. (Yale, 1968); William M. Thompson, M.D. (Pennsylvania, 1969).

Associate Professors: James D. Bowie, M.D. (Oklahoma, 1967); William H. Briner, B.S. (Temple, 1954); C. Craig Harris, M.S. (Tennessee, 1951); Ronald Jaszczak, Ph.D. (Florida, 1968); G. Allen Johnson, Ph.D. (Duke, 1974); Frederick M. Kelvin, M.D. (Univ. of London, 1966); Salutario Martinez, M.D. (Havana Univ., 1961); David F. Merten, M.D. (Cincinnati, 1948); Dennis R. S. Osborne, M.D. (Univ. of London, 1967); Robert H. Wilkinson, Jr., M.D. (Washington Univ. 1958); Joseph P. Workman, M.D. (Maryland, 1946).

Assistant Professors: Jerry S. Apple, M.D. (Duke, 1978); Mark E. Baker, M.D. (Loyola, 1978); Maureen M. Bidula, M.D. (Temple, 1979); Simon D. Braun, M.D. (Emory, 1977); William Foster, Jr., M.D. (Duke, 1973); David Godwin, M.D. (Stanford, 1971); Robert A. Halvorsen, Jr., M.D. (Miami, 1974); Laurence Hedlund, Ph.D. (Pittsburgh, 1968); Robert J. Herfkens, M.D. (Loyola, 1974); Maroon B. Khoury, M.D. (American Univ. of Beirut, 1979); Barry S. Mahony, M.D. (Colorado, 1979); Glenn E. Newman, M.D. (Duke, 1973); Louis M. Perlmutter, M.D. (North Carolina at Chapel Hill, 1977); Stephen J. Riederer, Ph.D. (Wisconsin, 1979); LeRoy Roberts, M.D. (Temple, 1975); Paul Silverman, M.D. (Massachusetts, 1977); Stephen J. Strom, Ph.D. (Kansas, 1978); Daniel C. Sullivan, M.D. (Vermont, 1970); Margaret E. Williford, M.D. (Duke, 1976); Andrew Yeates, M.D. (Northwestern, 1977).

Associates: Russell A. Blinder, M.D. (Pennsylvania, 1979); Caroline Chiles, M.D. (Duke, 1977); Richard H. Cohan, M.D. (New York Univ., 1979); Cirrelda Cooper, M.D. (Northwestern, 1980); William T. Djang, M.D. (Johns Hopkins, 1977); Barbara E. Hoeck, M.D. (George Washington, 1978); Fernando F. Illescas, M.D. (McGill, 1979); Charles Daniel Johnson, M.D. (Rochester, 1979); Alan S. Muraki, M.D. (Utah, 1978); Jeffery Oke, M.D. (Michigan, 1980); William W. Woodruff, M.D. (Virginia, 1981).

Research Associates: Mark A. Brown, Ph.D. (Duke, 1982); Carey E. Floyd, Ph.D. (Duke, 1981).

DIVISION OF RADIATION BIOLOGY

Associate Professors: William D. Currie, Ph.D. (North Carolina at Chapel Hill, 1964); Randy L. Jirtle, Ph.D. (Wisconsin, 1975).

Assistant Professor: Raymond U, Ph.D. (Kyoto, Japan, 1970).

DIVISION OF RADIATION PHYSICS

Professor: Fearghus O'Foghludha, Ph.D. (Natl. Univ. of Ireland, 1961), *Director*.

Assistant Professors: Mark J. Engler Ph.D. (Mass. Inst. of Tech., 1969); Daniel Miller, Ph.D. (North Carolina State, 1971); Charles E. Nelson, Ph.D. (Ohio, 1973).

Research Associate: James W. Blackburn.

Associate: Conrad Knight.

DIVISION OF RADIATION THERAPY

Professor: Leonard Prosnitz, M.D. (State Univ. of New York, 1961), *Director*.

Professor: Gustavo S. Montana, M.D. (Bogota, Columbia, 1960).

Associate Professors: James R. Oleson, M.D., Ph.D. (Arizona, 1976); Boyd T. Worde, M.D. (Tennessee, 1947).

Assistant Professors: Ian Crocker, M.D. (Saskatchewan, 1976); Mark W. Dewhirst, D.V.M., Ph.D. (Colorado, 1979); Dale L. Duncan, M.D. (South Carolina, 1979); Edward E. Halperin, M.D. (Yale, 1979).

Emeriti: George J. Baylin, M.D.; Alice L. McCrae, M.D.

Required Course

RAD-200. The basic course in radiology for all medical students is combined with physical diagnosis and laboratory diagnosis into IND-200. The course is a concentrated lecture series with correlating demonstration laboratories designed to provide a broad introductory exposure to the entire field of diagnostic radiology.

Electives

RAD-221(B). General Physics of Radiology. Basic physics underlying radiation diagnosis and therapy, emphasizing production and measurement of ionizing radiation and radiation interactions in tissue; physical rationale of radiation methods in clinical practice; survey of recent developments in radiological equipment; radiation hazards. Weight: 2. *O'Foghludha*

RAD-223(B). Radioisotope Methods and Techniques in Biomedical Research. Introduction to principles and practices in biomedical research applications of radioactive materials: fundamentals of radioactivity, nuclear instrumentation, counting methodology, statistics of counting, liquid scintillation counting, external standard ratio, sample preparation. This course will be helpful for those seeking state or federal licenses for biomedical research uses of radioactive materials. Weight: 2. *O'Foghludha, Currie, and Knight*

RAD-227(B). General Radiobiology. Basic fundamentals essential to an understanding of biological effects of ionizing radiation. Major sections include radiation physics, radiation dosimetry, target theory, and activated water theory in radiation damage, oxygen effect, radiobiochemistry, subcellular effects, tissue radiosensitivity, general radiation syndrome. Weight: 2. *Jirtle, Currie, Dewhirst, and Halperin*

RAD-231(B). Introduction to Radiological Sciences. Basic principles underlying radiography, contrast materials, ultrasound, nuclear medicine, computerized tomography, and nuclear magnetic resonance will be presented. A thorough review of radiographic anatomy will precede an organ-system approach to radiologic-pathologic correlation. Lectures will be supplemented with demonstrations. Weight: 3. *Effmann, Thompson, and Putman*

RAD-250(B). Research in Radiology. An individually arranged experience in which the student identifies with and participates in an established research program

of a faculty member. Program should be arranged with DPA and proposed faculty member well in advance of starting date. Weight: 1-8. *Effmann, Thompson, and Putman*

RAD-210(C). Pediatric Radiology. A specialized program of instruction and participation in the wide variety of radiographic examinations in the pediatric age group. Special correlation of these examinations to the problems of specific diagnosis and patient care will be made. Students must contact Dr. Kirks prior to registration. Weight: 4-8. *Kirks and staff*

RAD-211(C). Clerkship in Neuroradiology. A specialized program of detailed instruction in neuroradiology. The program includes participation in the performance and interpretation of a variety of examinations including cerebral angiography, pneumoencephalography, computerized axial tomography, nuclear magnetic resonance, myelography, cisternography, and others. Students must contact Dr. Yeates prior to registration. Weight: 4. *Yeates and staff*

RAD-215(C). Clinical Radiation Oncology. Half of all cancer patients require radiation therapy of curative or palliative intent at some point in their care. This course provides clinical experience in evaluation, treatment, and follow-up of patients treated in the Division of Radiation Oncology. The course is particularly directed to students with career goals in medical, radiation, or surgical oncology. Students must contact Dr. Prosnitz prior to registration. Weight: 4-8. *Prosnitz and staff*

RAD-229(C). Basic Radiology Clerkship. This is designed to provide a broad exposure to varied aspects of diagnostic radiology. The elective consists of: (a) an informal lecture course, supplemented by student presentations; (b) weekly rotations observing the performance and discussing the interpretation of radiographic procedures; (c) use of an extensive teaching file of radiographs; (d) viewing a series of audiovisual tapes. One or two weeks are spent on the chest rotation, the other rotations are at the individual students' discretion, and may include GI, GU, bone, neuro, pediatrics, vascular, nuclear medicine, body computed tomography or ultrasonography. Rotations to the VA radiology department may also be arranged. All registrants will meet with Dr. Kelvin the morning of the first day of the course to discuss their individual rotations. Weight: 4-8. *Kelvin, Chen, and staff*

Surgery

James B. Duke Professor: David C. Sabiston, Jr., M.D. (Johns Hopkins, 1947), *Chairman*.

DIVISIONS OF GENERAL AND CARDIO-THORACIC SURGERY

Professors: James B. Duke Professor D. Bernard Amos, M.D. (Guys Hospital, London, 1963), Experimental Surgery; William G. Anlyan, M.D. (Yale, 1949); James B. Duke Professor Dani P. Bolognesi, Ph.D. (Duke, 1964), Experimental Surgery; Eugene D. Day, Ph.D. (Delaware, 1952), Experimental Surgery; Howard C. Filston, M.D. (Western Reserve, 1962); Robert H. Jones, M.D. (Johns Hopkins, 1965); Joseph A. Moylan, Jr., M.D. (Boston, 1964); H. Newland Oldham, Jr., M.D. (Baylor, 1961); William P. J. Peete, M.D. (Harvard, 1947); Hilliard F. Seigler, M.D. (North Carolina at Chapel Hill, 1960); Edwin L. Jones and Lucille Finch Jones Cancer Research Professor of Surgery William W. Shingleton, M.D. (Bowman Gray, 1943); Del-ford L. Stickel, M.D. (Duke, 1953); Andrew S. Wechsler, M.D. (State Univ. of New York, 1964); Walter G. Wolfe, M.D. (Temple, 1963); W. Glenn Young, Jr., M.D. (Duke, 1948).

Clinical Professors: Steward M. Scott, M.D. (Baylor, 1951); Gulshan K. Sethi, M.D. (All India, 1963); Timothy Takaro, M.D. (New York Univ., 1943).

Associate Professors: Onyekwere Akwari, M.D. (Southern California, 1970); Darel D. Bigner, M.D. (Duke, 1965), Ph.D. (Duke, 1971), Experimental Surgery; John P. Grant, M.D. (Chicago, 1969); George S. Light, Jr., M.D. (Duke, 1972); Philip D. Lumb, M.B.B.S. (London University School of Medicine, 1974); Alfred Sanfilippo, M.D. (Duke, 1975); Ph.D. (Duke, 1976), Experimental Surgery; Wirt W. Smith, M.D. (Texas, 1951), Experimental Surgery; John L. Weinerth, M.D. (Harvard, 1967).

Associate Medical Research Professors: Per-Otto F. Hagen, F.H.W.C. (Watt University, Edinburgh, Scotland, 1961), Experimental Surgery; Alphonse J. Langlois, Ph.D. (Duke, 1966), Experimental Surgery.

Associate Clinical Professor: James E. Davis, M.D. (Pennsylvania, 1943).

Adjunct Associate Professor: Jeffrey J. Collins, Ph.D. (Harvard, 1972), Experimental Surgery.

Assistant Professors: L. George Alexander, M.D. (Duke, 1973); Ralph R. Bollinger, M.D. (Tulane, 1970), Ph.D. (Duke, 1977); Miles W. Cloyd, Ph.D. (Duke, 1976), Experimental Surgery; Norbertus P. DeBruijn, M.D., M.Sc. (Univ. of Gronigen, 1976); Gregory S. Georgiade, M.D. (Duke, 1973); Michael S. Gorbach, M.D. (Maryland, 1979); J. Dirk Iglehart, M.D. (Harvard, 1975); James E. Lowe, M.D. (California at Los Angeles, 1973); Richard L. McCann, M.D. (Cornell, 1974); William C. Meyers, M.D. (Columbia, 1975); Glenn E. Newman, M.D. (Duke, 1973); J. Scott Rankin, M.D. (Tennessee, 1969); Frances F. Ward, Ph.D. (Brown, 1965), Experimental Surgery.

Assistant Medical Research Professors: Anwar S. Abd-Elfattah, Ph.D. (Mississippi, 1979); George Konstantinow, Jr., Ph.D. (North Carolina at Chapel Hill, 1980); Bruce Lobaugh, Ph.D. (Pennsylvania, 1981); Thomas J. Matthews, Ph.D. (Missouri, 1971); Elmer J. Rauckman, Ph.D. (Duke, 1975); Gary Stuhlmiller, Ph.D. (Duke, 1976), Experimental Surgery; Kent J. Weinhold, Ph.D. (Pennsylvania, 1979).

Assistant Clinical Professors: Albert H. Bridgman, M.D. (Louisiana, 1956); Rollins S. Burhans, Jr., M.D. (Louisville, 1963); Gordon M. Carver, M.D. (Duke, 1948); Richard L. Dales, M.D. (South Carolina, 1976); John T. Daniels, M.D. (Howard, 1964); Thomas L. English, M.D. (Duke, 1969); Thomas J. Enright, M.D. (Buffalo, 1948); Richard A. Hall, M.D. (Tulane, 1971); Walter J. Loehr, M.D. (Cornell, 1963); F. Maxton Mauney, Jr., M.D. (Duke, 1959); W. B. McCutcheon, Jr., M.D. (Virginia, 1952); Amir A. Neshat, M.D. (Isfahan University, Iran, 1960); E. Wilson Staub, M.D. (Northwestern, 1957); Charles D. Watts, M.D. (Howard, 1943); David K. Wellman, M.D. (Duke, 1971); James S. Wilson, Jr., M.D. (North Carolina at Chapel Hill, 1975).

Clinical Associates: Ray A. Ashcraft, B.S. (North Texas State, 1958), D.D.S. (Baylor, 1963), Dentistry; Lawrence E. Scheitler, D.D.S. (Maryland, 1975), Dentistry; James T. White, D.D.S. (Loyola, 1966), M.S. (North Carolina at Chapel Hill, 1976), Dentistry.

Medical Research Associate: Paul Hendrix, B.S. (Coll. of Charleston, 1970), B.H.S. (Duke, 1975).

Research Associates: Susan M. Blanchard, Ph.D. (Duke, 1982); Timothy Darrow, Ph.D. (State Univ. of New York, 1980); James W. Davis, M.S.E.E. (Duke, 1974); Gudrun Huper, M.A. (Stuttgart, Germany); Sугanto Sutjipto, Ph.D. (North Carolina State, 1979).

DIVISION OF NEUROSURGERY

Professor: Robert H. Wilkins, M.D. (Pittsburgh, 1959), *Chief*.

Professor: Blaine S. Nashold, M.D. (Louisville, 1949).

Associate Professor: Wesley A. Cook, Jr., M.D. (Oregon, 1963).

Assistant Professors: Dennis E. Bullard, M.D. (St. Louis, 1975); Allan H. Friedman, M.D. (Illinois, 1974); Richard S. Kramer, M.D. (Duke, 1962); W. Jerry Oakes, M.D. (Duke, 1972); Bruno J. Urban, M.D. (Germany, 1960).

Assistant Clinical Professors: Bruce L. Kihlstrom, M.D. (North Carolina at Chapel Hill, 1972); Walter S. Lockhart, M.D. (Bowman Gray, 1944); Robert E. Price, Jr., M.D. (North Carolina at Chapel Hill, 1964).

Research Associates: Janice O. Levitt, Ph.D. (Temple, 1963); Robert D. Pearlstein, M.S. (North Carolina at Chapel Hill, 1978).

DIVISION OF ORAL SURGERY

Professor: Donald Serafin, M.D. (Duke, 1964), *Chief*.

Associate Professor: John C. Angelillo, D.D.S., M.D. (Duke, 1970).

Assistant Professor: Edward A. Dolan, D.D.S. (Maryland, 1971).

DIVISION OF ORTHOPAEDIC SURGERY

Professor: James R. Urbaniak, M.D. (Duke, 1962), *Chief*.

Professors: Frank H. Bassett III, M.D. (Louisville, 1957); Frank W. Clippinger, M.D. (Washington, 1952); James B. Duke Professor J. Leonard Goldner, M.D. (Nebraska, 1943); Donald E. McCollum, M.D. (Bowman Gray, 1953).

Associate Professor: John M. Harrelson, M.D. (Duke, 1964).

Associate Clinical Professors: Ralph W. Coonrad, M.D. (Duke, 1947); John Glasson, M.D. (Cornell, 1943); Frank H. Stelling III, M.D. (Georgia, 1938).

Assistant Professors: Robert D. Fitch, M.D. (Duke, 1976); William E. Garrett, M.D., Ph.D. (Duke, 1976); Richard D. Goldner, M.D. (Duke, 1974); William T. Hardaker, M.D. (Duke, 1973); Salutario Martinez, M.D. (Havana Univ., 1961); James A. Nunley II, M.D. (Tulane, 1973).

Assistant Clinical Professors: William J. Callison, M.D. (Vanderbilt, 1953); J. Lawrence Frank, M.D. (Duke, 1965); J. George Jonas, M.D. (Zurich, 1954); Stephen N. Lang, M.D. (Illinois, 1965); C. Robert Lincoln, M.D. (Med. Coll. of Virginia, 1960); Angus M. McBryde, Jr., M.D. (Duke, 1963); William S. Ogden, M.D. (Med. Coll. of Georgia, 1965); Edwin T. Preston, Jr. M.D. (Duke, 1960); Glydon B. Shaver, Jr., M.D. (Tennessee, 1961).

Adjunct Assistant Professor: Marcia M. Goldner, Ph.D. (Duke, 1972).

Clinical Associates: Richard F. Bruch, M.D. (Illinois, 1972); Albert T. Jennette, M.D. (North Carolina at Chapel Hill, 1959); Leslie C. Meyer, M.D. (Nebraska, 1943); Ronald A. Pruitt, M.D. (Med. Coll. of Virginia, 1959); William A. Somers, M.D. (Duke, 1972).

DIVISION OF OTOLARYNGOLOGY

Professor: William R. Hudson, M.D. (Bowman Gray, 1951), *Chief*.

Associate Professors: T. Boyce Cole, M.D. (North Carolina at Chapel Hill, 1962); Joseph C. Farmer, Jr., M.D. (Duke, 1962); Patrick D. Kenan, M.D. (Duke, 1959).

Associate Medical Research Professor: John H. Casseday, Ph.D. (Indiana, 1970).

Associate Clinical Professor: Carl M. Patterson, M.D. (Maryland, 1944).

Assistant Professor: Samuel R. Fisher, M.D. (Duke, 1975).

Assistant Clinical Professors: James W. Brown, Jr., M.D. (Duke, 1941); Charles E. Clark III, M.D. (Michigan, 1968); Seth G. Hobart, Jr., M.D. (Virginia, 1950); Lynn A. Hughes, M.D. (Oklahoma, 1968); Clay W. Whitaker, M.D. (Western Reserve, 1952); C. Emery Williams, M.D. (Louisiana State, 1963).

Clinical Associates: Peter G. Chikes, M.D. (North Carolina at Chapel Hill, 1972); Edward V. Hudson, M.D. (Bowman Gray, 1962); William B. Inabnet, M.D. (Louisiana, 1958); Charles H. Mann, M.D. (West Virginia, 1966); Hubert C. Patterson, M.D. (North Carolina at Chapel Hill, 1974); Thaddeus H. Pope, Jr., M.D. (North Carolina at Chapel Hill, 1957).

Research Associates: Ellen Covey, Ph.D. (Duke, 1980); Blake Wilson, B.S. (Duke, 1974).

DIVISION OF PLASTIC AND MAXILLOFACIAL SURGERY

Professor: Donald Serafin, M.D. (Duke, 1964), *Chief*.

Professors: Edward Clifford, Ph.D. (Minnesota, 1954); Nicholas G. Georgiade, D.D.S., M.D. (Duke, 1949); Robert M. Mason, D.M.D. (Kentucky, 1977), M.S.O. (North Carolina at Chapel Hill, 1979), Orthodontics; Galen W. Quinn, D.D.S. (Creighton, 1952), Orthodontics.

Associate Professor: John C. Angelillo, D.D.S. (Duke, 1970).

Associate Clinical Professor: George F. Crikelair, M.D. (Wisconsin, 1944).

Assistant Professors: William J. Barwick, M.D. (Tennessee, 1971); Ronald Riefkohl, M.D. (Tulane, 1972).

Assistant Clinical Professor: Verne C. Lanier, Jr., M.D. (Vanderbilt, 1966).

Research Associate: Ruth S. Georgiade, M.A. (Duke, 1950).

DIVISION OF UROLOGIC SURGERY

Professor: David F. Paulson, M.D. (Duke, 1964), *Chief*.

Professors: E. Everett Anderson, M.D. (Duke, 1958); Lowell R. King, M.D. (Johns Hopkins, 1956).

Associate Professors: Robert A. Bonar, Ph.D. (California at Berkeley, 1953), Biophysics; Culley C. Carson III, M.D. (George Washington, 1971); John L. Weinerth, M.D. (Harvard, 1967).

Associate Clinical Professors: John H. Grimes, M.D. (Northwestern, 1965); Jack Hughes, M.D. (Pennsylvania, 1943).

Assistant Professors: Andrew F. Meyer, M.D. (New York, 1969); Philip J. Walther, M.D., Ph.D. (Duke, 1975); George S. Webster, M.B., Ch.B. (Univ. Coll. of Rhodesia, 1968).

Assistant Medical Research Professors: John W. Day, Ph.D. (Iowa, 1972); Joy L. Ware, Ph.D. (North Carolina at Chapel Hill, 1979); Karen S. Webb, Ph.D. (North Carolina at Chapel Hill, 1973).

Assistant Clinical Professors: A. James Coppridge, M.D. (Virginia, 1953); Joyce D. Coughlin, M.D. (Buffalo, 1944); Hector H. Henry II, M.D. (Tulane, 1965); Sigmund I. Tannenbaum, M.D. (Duke, 1975); Edwin M. Tomlin, M.D. (Tennessee, 1946).

Associate: Steven H. Herman, Ph.D. (Duke, 1977).

Clinical Associates: James A. Bergant, M.D. (Kansas, 1969); Alexander Maitland III, M.D. (Yale, 1955); Randall B. Vanderbeek, M.D. (Duke, 1963).

Clinical Instructors: Oscar W. Brazil, Jr., M.D. (Louisiana, 1961); Raymond E. Joyner, M.D. (Bowman Gray, 1968).

PROGRAM IN HEARING AND SPEECH DISORDERS

Professor: LuVern H. Kunze, Ph.D. (Iowa, 1962), *Director*.

Associate Professor: Bruce A. Weber, Ph.D. (Illinois, 1966).

Assistant Professors: Jennifer Horner, Ph.D. (Florida, 1977); John E. Riski, Ph.D. (Florida, 1976).

Associates: Burton B. King, M.A. (Northwestern, 1955); Robert G. Paul, Ph.D. (Oklahoma, 1969).

Emeriti: Lennox D. Baker, M.D.; John E. Dees, M.D.; Clarence E. Gardner, Jr., M.D.; Keith S. Grimson, M.D.; Guy L. Odom, M.D.; Norman F. Ross, D.D.S.; Will C. Sealy, M.D.; James H. Semans, M.D.; Barnes Woodhall, M.D.

Required Course

SUR-205. The required course in surgery, is given in the second year and consists of an eight week clinical clerkship. The primary goal is the presentation of those con-

cepts and principles which characterize the discipline of surgery. The fundamental features which form the foundation of surgical practice are presented at seminars three times weekly. The subjects discussed include antisepsis, surgical bacteriology, wound healing, inflammation, fluid and electrolyte balance, shock, the metabolic response to trauma, biology of neoplastic disease, gastrointestinal physiology and its derangements, and blood coagulation, thrombosis, and embolism.

The students are divided into two groups, one at Duke and the other at the VA Hospital, and each works with two members of the surgical faculty. Students are assigned patients on the surgical wards for diagnosis and management, and clinical rounds are made three times weekly with the faculty. A full-time teaching resident is assigned for the course in order to provide the students with continuous and readily available instruction at all times. A one hour session is devoted daily to demonstrations by the surgical specialties including neurosurgery, orthopaedics, otolaryngology, plastic surgery, and urology. The students attend a weekly session in experimental surgery, during which each student serves in rotation as the anesthesiologist, first assistant, and operating surgeon in performance of surgical procedures on experimental animals.

Electives

SUR-219(C). Advanced General and Thoracic Surgery (VA Hospital). The student will function as a subintern in surgery. Special attention will be given to those subjects in surgery common to all medical practices. Patients will be assigned to the students who will assume primary responsibility for their care under the supervision of the faculty and residents. The major emphasis will be on physiologic and pathologic changes, diagnosis, indications for operation, and observation of surgical procedures. Weight: 8. *Postlethwait, Grant, Seigler, Stickel, Wechsler, Akwari, and Lowe*

SUR-221(C). Surgical Specialties and Ophthalmology (VA Hospital). The student will attend selected conferences of all the surgical specialties and ophthalmology. Additionally, the student will select two or three of these specialties in which to concentrate experience (on one service at a time) in the operating rooms, clinics, and wards of the VA Hospital. Pathophysiology, diagnosis, and treatment will be emphasized. Weight: 8. *Grant, Walther, McCuen, Fisher, Friedman, Harrelson, and Barwick*

SUR-222(C). Clinical Dentistry. Normal and abnormal development of head, face, jaws, and oral structures. Importance of teeth for mastication, speech, deglutition, growth and development, esthetics, general health, and for treatment of congenital and acquired abnormalities of the cranium, face, and jaws. Examination, diagnosis, and treatment of pediatric to geriatric oral dental disease. Orthodontic, surgical, and/or orthodontic-surgical management of orodentofacial problems. Weight: 1. *Quinn and Angelillo*

SUR-226(C). Clerkship in Urologic Oncology. The student will learn the clinical presentation, pathophysiology, diagnosis, treatment, and follow-up of patients with urologic malignancies. Emphasis is placed on the principles and practice of urologic oncology, particularly as they apply to solid tumors, and on surgical management of malignant disease, supported by radiotherapeutic and chemotherapeutic adjuncts. Students will participate in pre-, intra-, and postoperative care of patients and will present patient cases at conferences. Students will also be exposed to the design of clinical trials. Weight: 4 or 8. *Paulson*

SUR-227(C). Advanced Urologic Clerkship. The diagnosis, management, and surgical treatment of patients with urologic disorders will be stressed. Students will be afforded intimate association with the entire staff in the clinics, wards, and operating rooms and will participate in surgery. Cystoscopic and urographic diagnostic

methods along with other techniques will be taught. Weight: 8. *Anderson, Paulson, King, Weinerth, Webster, Carson, Walther, and Dunnick*

SUR-228(C). Clerkship in Pediatric Urology. Designed to give an overview of urologic problems in the pediatric population. Will include patient contact and seminar material as well as ward and operating room experience in the diagnosis, treatment, and long-term followup of children with urologic disease. Weight: 4. *King*

SUR-230(C). Seminar in Urologic Diseases and Techniques. Lecture-seminar course by members of the staff in urology and radiology, providing an introduction to the spectrum of urologic diseases, amplified by demonstration of urologic and radiologic diagnostic methodology. Clinical problems to be stressed include endocrinopathies, pediatric urology, obstructive uropathies, renovascular hypertension, urinary calculi, and urologic malignancies. Informal seminars given weekly. Weight: 8. *Anderson, Paulson, King, Weinerth, Webster, Carson, Walther, and Dunnick*

SUR-233(C). Basic Neurosurgery Course. Disease conditions commonly encountered in neurosurgery are presented. Clinical presentation of a disorder, such as brain tumor or head injury, is made by a member of the staff. Clinical features and plan of diagnostic investigation are stressed. The clinical disorder is used as a focal point from which to carry the presentation into the basic sciences are related to the clinical problem. Weight: 1. *Cook, Wilkins, Kramer, Oakes, and Friedman*

SUR-234(C). Pediatric Neurosurgery. Survey of the major neurosurgical topics encountered in the pediatric age group. Emphasis will be given to the demonstration of clinical findings, necessary radiographic evaluation and therapeutic alternatives in selected disease processes. Weight: 1. *Oakes and Wilkins*

SUR-235(C). Clinical Neurosurgery. Course is designed for those students with future interest in the neurological sciences. Duties include the workup and care of inpatients, workup of clinic patients, assistants in the operating room, daily rounds, and night call. Weekly conferences are held in neurosurgery, neurology, neuropathology, and neuroradiology. There are also special lectures. Weight: 8. *Wilkins, Nashold, Cook, Kramer, Oakes, and Friedman*

SUR-236(C). Clinical Neurosurgery. This elective, intended as an intermediate experience between SUR-233(C) and SUR-235(C), focuses on the clinical presentation of common neurosurgical disorders, radiographic evaluation, and therapeutic options including the indications and contraindications for surgical intervention. The student will work up one to three patients in the evening and assist at their operations the following day either once or twice per week and will attend the 8 A.M. Saturday neurological conference. Prerequisite: permission of instructor. Weight: 1 or 2. *Wilkins*

SUR-237(C). Investigative Neurosurgery. The student is assigned a project relating to the neurological sciences and, within reason, is provided with technical help, recording equipment, and experimental animals necessary for its completion. Each student plans and executes an individual project, with the help of the neurosurgery staff. Attendance at weekly conferences is required. Weight: 8. *Wilkins, Nashold, Kramer, and Friedman*

SUR-239(C). Clinical Otolaryngology. This course will provide the student with a comprehensive survey of clinical otolaryngology. Duties will include participation in both outpatient clinic activities and inpatient care in addition to assisting in the operating room. The student will participate in ward rounds and in the various conferences held by the division. Weight: 4 or 8. *Hudson, Kenan, Cole, Farmer, and Fisher*

SUR-240(C). Otolaryngologic Seminar. This conference and demonstration course will provide an introduction to a variety of clinical problems in otolaryngology.

Lectures will be supplemented with case presentations illustrating problems encountered in this field. Weight: 1. *Hudson*

SUR-242(C). Psychophysiology of Hearing. An examination of the relation of anatomy and physiology of the central auditory system to auditory discriminations. Original papers on neuroanatomy, electrophysiology, and psychophysics of hearing will be read and discussed. Also listed as Psychology 286 in *Graduate School Bulletin*. Weight: 3. *Casseday*

SUR-245(C). Reconstructive Plastic Surgery. A study of broad principles of trauma, wound, healing, and varied reparative processes. Weight: 8. *N. Georgiade, Serafin, Riefkohl, Barwick, and G. Georgiade*

SUR-246(C). Clerkship in Plastic and Reconstructive Surgery. The student participates in evaluation and management of plastic surgery patients, including pre-operative assessment, surgical assistance, and postoperative follow-up in a private office and at Durham County General Hospital. Daily seminars cover core topics such as skin and surgical techniques, wound healing, and scars. Prerequisite: permission of instructor. Weight: 4. *Lanier*

SUR-255(C). Seminar in Medical Speech/Language Pathology and Audiology. Overview of normal speech, hearing and language systems, and consideration of principles of evaluation and rehabilitation of communication disorders including hearing impairments, childhood language disorders, stuttering, aphasia, voice disorders, laryngectomy, and craniofacial anomalies. Weight: 1. *Kunze and Weber*

SUR-259(C). General Principles of Orthopaedics. A full-time or part-time experience on the orthopaedic service with duties and responsibilities similar to a junior intern. Inpatient care, outpatient examination, and operating room experiences are included. Individual or group discussions each day with attending staff. The purpose of the course is to present broad concepts of orthopaedics to students planning general practice, pediatrics, allied surgical specialties, or orthopaedics. Weight: 4 or 8. *J. Goldner, Clippinger, McCollum, Bassett, Urbaniak, Harrelson, Hardaker, Nunley, R. Goldner, Garrett, and staff*

SUR-261(C). Office and Ambulatory Orthopaedics. A full or part-time experience on the orthopaedic service with duties and responsibilities similar to a junior intern. Inpatient care, outpatient examination, and operating room experiences are included. Individual or group discussions each day with attending staff. The purpose of the course is to offer clinical experience to students who have completed Surgery 259(C). Rotations will be similar to those of Surgery 259(C). Weight: 8. *Bassett, Clippinger, J. Goldner, McCollum, Urbaniak, Bugg, Coonrad, Lincoln, Glasson, Lang, Frank, Harrelson, Hardaker, R. Goldner, Garrett, and Nunley*

SUR-267(C). Clinical Conference in Cerebral Palsy and Children's Orthopaedics. Conference is arranged for those interested in neurological disease, pediatric orthopaedic problems, and related fields. These conferences demonstrate both the individual and group approach to the patient with complex neurologic conditions as it effects both growth and development. Outpatients and inpatients are utilized for subject material. Staff personnel readily available for individual seminars. Weight: 2 or 4. *Coonrad, Goldner, and cerebral palsy staff*

SUR-276(C). Advanced Clerkship in Pediatric Surgery. This course is designed to familiarize the student with the whole range of surgical problems in children but with emphasis on the pathophysiology of surgical and related problems in the newborn infant and the total care of the child with a malignancy. The student is encouraged to participate fully in the patient care aspects of the service, and is considered an integral part of the patient care team. Although the course may be taken for the

full eight weeks, it is felt that a four-week experience is probably optimal for most students. It may be combined with other advanced surgical clerkships, such as Surgery 299(C); or with four weeks of neonatology, Pediatrics 225(C); or other courses depending on the interests of the student. Weight: 4 or 8. *Filston*

SUR-277(C). Orthopaedic Research. Individual projects are assigned for completion during a limited period of time. A student works with an investigator in the orthopaedic laboratory either at Duke Medical Center or the Durham VA Hospital. Clinical investigative studies are also available at both institutions. Weight: 8. *Goldner, Urbaniak, Harrelson, R. Goldner, Garrett, orthopaedic senior staff, and house staff*

SUR-281(C). Introduction to Fractures and Musculoskeletal Trauma. Students will participate in the emergency management of patients through the Duke Emergency Room primarily, but also through Durham County General and the Durham VA Hospitals. Principles of fractures in trauma will be given throughout the week at specified times and attendance at fracture conference will be required. Participation in orthopaedic clinic (seeing patients) one day per week will be required. Weight: 3. *Entire senior staff at Duke and Durham County General, supervision by Dr. Goldner at Duke, Dr. Harrelson at VA, and Dr. Lang at Durham County General*

SUR-282(C). Advanced Surgery—Emphasis Cancer. Advanced concepts in surgery will be presented in seminars, and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to clinical cancer and related basic topics, and the remainder to surgery generally. Weight: 8. *Seigler, Grant, Irlehart, Leight, and Shingleton*

SUR-283(C). Advanced Surgery—Emphasis Cardiovascular-Thoracic. Advanced concepts in surgery will be presented in seminars and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to cardiovascular-thoracic surgery and related basic topics, and the remainder to surgery generally. Weight: 8. *Sabiston, Jones, Lowe, Oldham, Rankin, Wechsler, Wolfe, and Young*

SUR-284(C). Advanced Surgery—Emphasis Transplantation. Advanced concepts in surgery will be presented in seminars, and in ward, clinics, and operating room experience. Fifty to 75 percent of the time will be devoted to clinical transplantation and related basic topics, and the remainder to surgery generally. Weight: 8. *Bollinger, Amos, Seigler, Stickel, and Weinert*

SUR-299(C). Advanced Surgical Clerkship. This course is structured to provide the student with a comprehensive approach to surgical disorders. Each student will choose to work in the clinics, or on the wards, in the operating rooms and in the laboratory with one senior surgeon. Advanced concepts in surgery will be taught and problem-solving techniques will be demonstrated. Weight: 4-8. *Sabiston, Akwari, Bollinger, G. Georgiade, Grant, Inglehart, Jones, Leight, Lowe, Meyers, McCann, Oldham, Peete, Postlethwaite, Rankin, Seigler, Shingleton, Stickel, Wolfe, and Young*

SUR-301(C). Emergency Department Surgical Care. Students desiring additional experience working with care of emergency surgical patients will be assigned to the emergency department one night per week for each credit desired. They will participate in the diagnosis and care of acute and traumatic surgical emergencies. Weight: 1-3. *Stickel and G. Georgiade*

SUR-303(C). Trauma Service. This course is designed to provide students interested in trauma care with further experience both in the Emergency Department and on the inpatient Trauma Service. The course will emphasize both triage and resuscitation for major and minor emergency problems in the Emergency Department and also preoperative and postoperative care on the inpatient Trauma Service. The

student will have a full-time experience by assuming duties and responsibilities similar to a junior intern. Emphasis will be placed on developing skills in the care of patients with multisystem injuries in the Emergency Department, Inpatient Service, and Operating Room. Students will work in conjunction with the attending staff and the residents on the trauma service. Weight: 8. *Moylan and G. Georgiade*

SUR-304(C). Nutrition in the Hospitalized Patient. This course is designed to acquaint students with the techniques of nutritional assessment including somatic protein, visceral protein mass, body fat mass, immune competence, and metabolic balance studies. Students will learn to determine basal energy expenditure and nitrogen requirements. The metabolic effects of acute and chronic starvation as well as stress and infection and the role played by these events in the hospital course of patients will be studied. Emphasis will be placed on techniques of nutritional support including routine and specialized hospital diets, routine and modular tube feeding diets, peripheral intravenous protein sparing, and total parenteral nutrition. At the completion of the course, students will have a thorough grasp of clinical nutrition and be able to apply specialized oral diets, tube feeding diets, and intravenous nutrition. Weight: 2. *Grant*

Special Interdisciplinary Course

IND-300(B) or (C). Interdisciplinary Seminar in Medical-Legal-Ethical Issues. The seminar will be composed of students in approximately equal number from the Medical, Divinity, and Law Schools, and will explore important medical, legal, and ethical features of current issues (e.g., transportation, euthanasia, abortion). Faculty and resource persons from all three schools will participate in the seminar. Up to four introductory sessions in the fall semester for all participating students and faculty will be concluded with arrangement of interdisciplinary terms and selected topics. Student teams will meet during the winter and consult at intervals with faculty. All semester participants will reassemble for a series of weekly meetings ending in mid-March, to present and discuss the topics researched. Any topics, properly focused, may be considered. Weight: 2. *Gianturco (medicine), Shimm (law), Smith (divinity) and other faculty members from all three schools*

Special Interdisciplinary Training Programs

BSP-301(B). Biobehavioral Study Program. The focus of the program will be to obtain an understanding of basic processes underlying normal and pathological human behavior. The year-long or two-term experience is designed to familiarize the medical student with significant developments in the behavioral sciences, investigative methodology used to examine human behavior, and the application of findings to medicine. Each student will be given the opportunity to focus on some determinant of human behavior which may include biological, psychological, developmental, or social factors. The major portion of the student's time will be spent in closely supervised library or laboratory research in an area of the student's interest, resulting in the preparation of a report of the work. To augment the specific interest of the student, either through seminars or guided readings, familiarity with current issues in the biobehavioral sciences will be emphasized. Students enrolled in this program may take courses given in the medical and graduate schools, and it is expected that they will integrate and balance their work with some courses of general medical importance. The faculty for the Biobehavioral Study Program is a multidisciplinary group representing several departments of the Medical School and the University and is involved in a broad range of interests in individual and group behavior. Students are encouraged to contact faculty members prior to enrollment in this study program to

investigate areas of mutual interest that will form the basis for the supervised research experience.

The following outline describes material from which topics may be chosen for individual research or for discussion in the seminar or guided reading portion of the course. Additional areas, not listed, may be considered.

1. *Orientation to Research in the Biobehavioral Sciences.* Assumptions; measurements; history and philosophy of science; application of computer technology in biobehavioral research.
2. *Psychological, Biochemical, Endocrinological, and Psychopharmacological Correlates of Behavior.* Methods and techniques; role of autonomic arousal as relating to psychophysiological experiments; interrelations of CNS and ANS functioning; neurochemical, neuroendocrine, and pharmacological factors affecting normal and abnormal feeling states, states of awareness, cognition, memory, and psychomotor manifestations; effect of CNS catecholamines, hormones, neuropeptides, and behavior; correlations between serum levels of psychotropic drugs and their metabolites and behavior response to drugs; platelet MAO; behavioral untoward effects of psychotropic drugs and their relationships to personality, serum levels of these drugs, and biochemical effects.
3. *Personality and Individual Differences.* Personality theories, psychopathology.
4. *Cognitive Processes.* Intelligence, perception, cognition, ability, learning and development.
5. *Groups and Social Processes.* Social pattern and communication; social deviance; psychological studies of minority groups, sociology of life cycle changes; group psychotherapy. Weight: 9 units per term. *Program Director: Clifford; Associate Director: Dr. Ellinwood*

CVS-301(B). Cardiovascular-Respiratory Sciences Study Program. The Study Program in Cardiovascular-Respiratory Sciences (CVS) is designed to offer third-year students instruction for one academic year in basic sciences as applied to the understanding of the cardiovascular and respiratory systems in health and disease. The program is interdepartmental in nature and will constitute a full credit load for those students who participate. It is comprised of two parts that run concurrently.

1. *Individual Tutorial.* The student will identify a senior member of the medical school faculty who is participating in the program and whose field of work is in the cardiovascular or respiratory area. The major part of the educational program for the student will be in the form of individual tutorials with this member of the staff. This tutorial may range from full-time independent research to an intensive study experience for the student. The student and the tutor will develop a plan and the student will review it with the director of the program.
2. *Group Seminar.* A seminar series will be developed according to the needs and desires of the students, the purpose of which is to read and discuss selected papers and/or discuss problems and topics which arise in the course of their tutorial. Students will be active participants in the seminar, and through this mechanism it is hoped to integrate knowledge of cellular physiology into an understanding of organ system function and control.

The above plan provides a structured and recommended curriculum design. Within this framework multiple pathways are available because of the concentration of effort in the tutorial experience. Tutorials can be arranged within any of the basic science departments or with individuals in clinical departments whose orientation or research is consistent with the goals of the program. Once a tutor is identified, added flexibility is gained by having the option to elect courses or seminars in addition to the group seminar. Weight: 9 units per term. *Program Director: P. Anderson*

EDR-301(B). Endocrinology and Reproductive Biology Study Program. This interdepartmental program is designed to provide third year medical students with an opportunity for indepth study of cellular endocrinology, neuroendocrinology, and reproductive biology as these relate to the function of the endocrine and reproductive systems in health and disease. In this program, major emphasis is placed on development of a plan of independent study for each student which is based on a tutorial or preceptor association with an individual member of the program faculty. In addition, all members of the program, including faculty, meet regularly for seminars, discussions, and guest lectures on selected topics of interest to the entire group. ANA/PHS 417, PHR-335, and ANA/PHS 418/424 are an integral part of the program. A student normally spends four terms in the program and receives full credit for the medical school advanced basic science requirement. Although the program traditionally begins in September, its structure is potentially flexible enough to accommodate those who wish to begin in any term, including the summer terms. It should be emphasized that while the primary aim of the program is to provide an intensive experience in endocrinology and reproductive biology, opportunity is provided within the program format for students to broaden their basic science background by taking courses which may be unrelated to the subject matter of the study program.

For all students, the program consists of the following components:

1. *An Individual Tutorial.* This is carried out in association with one or more senior faculty members selected by the student and generally involves laboratory research in a particular area of endocrinology or reproductive biology. Before entering the program, students are asked to complete their tutorial arrangements. In order to facilitate this process, the Program Director will, on request, direct students to appropriate members of the program faculty or other members of the Medical School faculty whose specialty and research interests would permit them to participate in the program.
2. *Lecture Courses.* Specific course offerings in this program are: PHR-335, Molecular Pharmacology; ANA/PHS 417, Cellular Endocrinology; ANA/PHS 418, Reproductive Biology; ANA/PHS 424, Seminar in Reproductive Biology. In order to provide additional breadth of preclinical experience related to immediate or long-term interests, students are encouraged to take up to four units of course work per term. As noted above, individual course selections are not limited to those related to endocrinology or reproductive biology, although consultation with the preceptor is recommended before making final selections. Weight: 18 units per semester. *Program Director: Schomberg*

EPI-301(B). Epidemiology Study Program. Epidemiology is the study of the distribution and determinants of disease occurrence in human populations. This study program will provide a basic grounding in epidemiologic principles and methods. Seminars, lectures, and research projects are combined to provide a comprehensive experience in quantitative approaches to the study of health and disease in populations.

Epidemiology is a science of growing importance. Its most important role today is the initial identification of causal associations and the formulation of new etiologic hypotheses. Increasingly, epidemiologists are being recognized as specialists in research design and data analysis for studies involving human subjects. The epidemiologic approach particularly lends itself to interdisciplinary research, since it borrows heavily from fields such as genetics, pathology, and immunology. Students will therefore be encouraged to take one or more related basic science courses outside of the study program.

The program will have a core of required courses and seminars supplemented by elective tutorials in areas of special interest. The required courses focus on epidemiologic and biostatistical research methods. Tutorials will take the form either of

participation in ongoing research projects or of individual supervised studies. Such study topics will be carefully selected so that they may be completed in a reasonable period of time and lead to publication of results.

Program Core (Required Courses)

1. *Epidemiologic Principles and Methods*. Instructors: Grufferman and Kimm. Topics covered in this course include the study of the distribution of disease in populations, issues in study design, data collection, and methods of analysis. Modules on the subjects of case-control, cohort and cross-sectional studies, clinical trials and intervention studies are presented. Methods are also introduced for assessing and dealing with bias, misclassification, and confounding. Primary reference papers serve as the main text for the course to enable students to gain facility in the critical review of medical literature. Lectures will be supplemented by outside readings, seminars, and student presentations. (Same as CFM-240(B).)
2. *Biostatistics in the Medical Sciences*. Instructor: DeLong. A practical approach to statistical methods and their use in medicine and the related health sciences. Particular emphasis will be placed on issues in the design, conduct, and interpretation of clinical and epidemiologic studies. Topics covered will include data collection and management, as well as tests of statistical significance for rates and ratios as measures of disease risk, survival analysis, variable selection techniques, and multivariate models for disease risk. Examples from real data and the medical literature will be used extensively. Also listed as CFM-215(B).
3. *Topics in Epidemiologic Research (Seminar)*. Instructors: Grufferman and Kimm. The seminars focus on problems in the design and conduct of epidemiologic studies and analysis of data. Discussion is based on faculty and student research projects and supplemented by selected readings. Visiting scientists will be invited to present their work at the seminars. Emphasis will be placed on critical analyses of epidemiologic studies. The range of topics will expose the student to all major aspects of epidemiology (e.g., areas of communicable disease, mental illness and chronic disease epidemiology). Open only to program participants.
4. *Research Projects in Epidemiology*. Instructors: Grufferman and Kimm. Students are required to participate in ongoing research projects or to conduct supervised studies of their own. A wide range of research topics is available to the student with emphasis on projects which can be completed in a reasonable period of time and lead to publication. Each student will work closely with an appointed preceptor.

Program Core (Optional Course)

Weight: 9 units per term. *Program Director: Dr. Seymour Grufferman*

ISP-301(B). Immunology Study Program. Objectives: this study program is designed for students whose career goals lie in one of the many clinical specialties which interface broadly with immunology: allergy-immunology, infectious diseases, rheumatology, hematology, transplantation, and oncology. A general fund of information is provided in the core course, Medical Immunology (MIC-330B), which emphasizes the role of immunologic mechanisms in various human disease states. Each student chooses a faculty preceptor, with whom an original research project is worked. It is encouraged that the student not be injected into the continuum of the preceptor's research interests but, rather, that an individual project is developed which can be completed during the study program. This laboratory effort may continue for two to four terms. The primary goals of the program are to encourage and develop the student's own creativity, to expose the student to the research interests and philosophies

of the entire division and to help the student gain a useful personal perspective on current immunologic thought with an emphasis on clinical relevance.

The student's efforts and time are divided as follows:

1. *Preceptorship*. The major emphasis of the program, during which the student functions much as a graduate student in the division. 30 hours or more per week.
2. *Basic Immunology (MIC-2918)*. An in-depth course in the basic concepts of immunology. Analysis of antigens and antibodies is followed by an emphasis of the cellular aspects and organization of the immune system, its regulation, and effector mechanisms. While primarily a graduate course, MIC-291(B) is strongly recommended for those students intending to pursue a career in immunologically related fields. 4 hours per week.
3. *Medical Immunology (MIC-330B)*. The basic concepts of immunochemistry and immunobiology are reviewed in the first two weeks, and the remainder of the course describes the role of these concepts in the pathogenesis and treatment of several human disease states. Emphasis is given to tumor immunology, immunohematology, immunologic deficiency diseases, neuroimmunology, transplantation, autoimmunity, inflammation, and allergy. Patient presentations when applicable. Because the course meets daily, more than superficial coverage of the topics can be achieved. 5 hours per week.
4. *Seminars for Research Progress*. Throughout the year each faculty member, fellow, and student in the division presents a brief informal seminar on on-going research. The discussion that follows is of great help to the presenter and allows the student to observe and participate in critical analysis of research before it is at the polished publication or formal seminar stage. 1 hour per week.
5. *Immunology Division Seminar*. A series of formal seminars by division faculty and visiting scientists. 1-2 hours per week.
6. *Additional Course Work*. The student may elect to take any of several courses in immunology and related fields, but is generally discouraged from excessively diluting the laboratory experience. Weight: 9 units per term. *Program Director: Dr. Cresswell*

MCD-301(B). Molecular and Cellular Basis of Differentiation Study Program.

Objectives: recent advances in molecular and cell biology provide new concepts in the area of developmental biology. This program is designed to give the medical student an appreciation of the phenomena of development as well as advanced training in a variety of biomedical disciplines. In order to provide a comprehensive coverage for many areas the program has been organized on a multidisciplinary level.

Particular emphasis is placed on the biochemistry of the cell surface as a basis of cell recognition, control of the cell cycle, and overall tissue organization. An analysis of protein nucleic acid interactions in chromosome structure and function are considered in the light of newer concepts of transcriptional and translational control. Studies also include nuclear cytoplasmic interactions as well as hormone induction of differentiation and development. The rapidly expanding body of knowledge gained from these approaches will be examined by the medical student through seminars. The program provides an opportunity for the medical student to obtain an introduction to advanced training or research in a field of study of interest, including hematology, endocrinology, pediatrics, and immunology.

The program can be selected by the student for one or two semesters. First Semester: the first semester will consist of (1) a series of lectures given three times a week to cover basic principles, and (2) a series of seminars conducted by the students under the guidance of the faculty. The student will learn through direct observation, participation, and discussion with the staff.

The students will meet Monday, Wednesday, and Friday at 11:20-12:10 to attend the introductory course in development and differentiation. This course covers basic principles and is taught by the entire faculty for the purpose of establishing a firm foundation for the more advanced studies to be given in the second semester. The students will also prepare and attend seminars in differentiation and development. These seminars will be conducted by the students under the guidance of the faculty.

Upon entrance into the program the student will be interviewed by the faculty to suggest a program that will complement a future medical career. Students may also elect to spend part of their time in a library project under close faculty supervision, to be presented in an in-depth seminar. As a general rule, mornings are reserved for course work and the afternoons for library tutorials.

Second Semester: the students in the second semester will attend an advanced course in development (#224) as well as other appropriate courses comprising the study program. It should be emphasized that the student is provided considerable flexibility in this program since there is no penalty for taking eighteen hours of course work for the first semester only. Weight: 18 per semester. *Cochairmen: McCarty and Counce*

NSS-301(B). Neurosciences Study Program. The neurosciences study program offers a comprehensive, integrated experience in the basic sciences focused on the nervous system. Fundamental principles of physiology, biochemistry, pharmacology, and anatomy are taught through an understanding of organizational and cellular neuroscience. The program lasts thirty-two weeks and includes optional lectures, a basic research experience under the guidance of a preceptor, and a monthly seminar. By emphasizing neuroscience, this program will be of use to students planning careers in several subspecialties of internal medicine (neurology, endocrinology, cardiology, infectious disease, genetic and metabolic disease), psychiatry, ophthalmology, pediatrics, or surgery. Weight: 9 per term.

1. *Lectures:* Trainees are encouraged to audit PHS 270 and 272 or other neurobiology courses during the year. They also should attend the basic neuroscience program for neurology residents and the neurology division study group during the year.
2. *Research Experience:* An important component of the neurosciences study program is the opportunity for investigation in a basic science laboratory. The trainee will select a preceptor and work in the preceptor's laboratory. The objective of the laboratory experience is to familiarize the student with experimental design, analytical techniques, and interpretation of data. Although the student will work on an individual project, he or she will acquire considerable general knowledge from pursuing a laboratory problem in depth.
3. *Seminar:* Throughout the year, faculty members and students meet monthly to present informally ongoing research. This seminar allows the student to participate in open, critical discussion of laboratory investigations as well as to develop skills in presenting scientific information clearly and concisely.
4. *Participating Faculty:*

Dr. Mohamed B. Abou Donia, (neurotoxicology). Major research interests are in the field of neurotoxicology including the mechanisms of neurotoxic actions, interactions, and pharmacokinetics of neurotoxicants. These chemicals include organophosphorus esters capable of causing delayed neurotoxicity and organic solvents.

Dr. Nell B. Cant, (neuroanatomy). Neuroanatomy of the auditory system; correlations of structure (synaptic organization) and function. Development of the auditory system.

Dr. James N. Davis, (neuropharmacology). Neuronal rearrangements after brain injury. The laboratory uses brain catecholamine neurons as models

for understanding neuronal plasticity using anatomical and biochemical techniques with an emphasis on neurotransmitter receptor pharmacology and brain anatomy.

Dr. Irving Diamond, (neurophysiology). The neocortex, its functional and structural subdivisions, and its evolution. The structural subdivision depends on the differences in laminar organization, for example, cytoarchitectonics, and most important, on connections. The concern for the cortex naturally leads to the study of the dorsal thalamus since the projections from the thalamus to cortex hold the key to understanding the organization of cortex.

Dr. Doyle G. Graham, (neuropathology). We are studying a group of neurotoxins which have a common feature, that of neurofilament accumulation within the axon and these include hexane, acrylamide, carbon disulfide, and IDPN.

Dr. William C. Hall, (neuroanatomy). Anatomical and physiological basis for sensori-motor integration in the central nervous system: the role of the superior colliculus in the control of eye movements.

Dr. Frans Jöbsis, (neurophysiology). Cerebral oxidative metabolism, *in vivo* monitoring of brain cellular metabolism in animals and man.

Dr. Norman Kirshner, (neuropharmacology). Biogenesis of chromaffin vesicles; mechanisms of catecholamine synthesis and secretion.

Dr. C.-S. Lin, (neuroanatomy). The mechanisms underlying the functional organization and reorganization at the level of single neurons. Combined neuroanatomical, neurophysiological, and immunocytochemical techniques will be used.

Dr. James McNamara, (neuropharmacology). Biochemical basis of epilepsy; studies of brain neurotransmitter receptors in animal models of seizures; study of the functional neuroanatomy of brain structures underlying seizures.

Dr. Richard Marchase, (developmental neurobiology). Determining the identities and interactions of cell surface molecules that are responsible for neuronal recognition and the formation of specific connections.

Dr. John W. Moore, (neurophysiology). Biophysics and physiology of nerve impulse propagation and synaptic transmission; computer modeling of neurons and networks.

Dr. J. Victor Nadler, (neuropharmacology). Excitatory amino acid neurotransmitters, models of temporal lobe epilepsy, neuronal plasticity and recovery of function after lesions.

Dr. Saul Schanberg, (neuropharmacology). Animal model of the maternal deprivation syndrome; regulation of hormone responses by the brain; neuropharmacology of amphetamines.

Dr. Donald Schmechel, (neuroanatomy). Classification and characterization of neurons in the thalamus and cortex. Current topics include subtypes of GABAergic inhibiting neurons and metabolic differences in neuronal subsets.

Dr. Theodore A. Slotkin, (neuropharmacology). Development of nervous system with particular attention to processes regulating maturation of synapses. Ongoing research includes studies of molecular biology of developing neurons, physiological function of autonomic pathways and adverse effects of exposure of the developing animal to toxic chemicals, drugs of abuse, or environmental stress.

Dr. George Somjen, (neurophysiology). The pathophysiology of the mammalian central nervous system is studied by electrophysiological and electrochemical techniques. Special topics include the mechanisms of

seizures, the nature of hypoxic damage to the brain, and the regulation of ion concentrations in the brain.

Dr. Wilkie A. Wilson, (neuropharmacology). The laboratory is exploring the regulation of excitability in the nervous system by physiological and pharmacological processes. Electrophysiological techniques are employed, using neural networks from both mammals and invertebrates.

5. *Codirectors*: Dr. James Davis and Dr. Wilkie Wilson

VSP-301(B). Virology Study Program. Objective: to indicate the relevance of investigative virology to problems of clinical medicine and to provide an introduction to recent advances in virus research. The student's efforts and time are divided as follows:

1. Lectures and Seminars: Students will take MIC-301(B), Principles of Infectious Diseases. (6 hours per week.)

This is a lecture and seminar course designed to familiarize students with the basic biologic concepts, the pathogenesis and the clinical manifestations of infectious diseases caused by bacteria viruses, fungi, rickettsia, and selected parasites. The host defenses to infectious agents including the acute inflammatory response and humoral and cellular immunity, and current future trends in the development of vaccines and antimicrobial and antiviral agents will also be discussed.

2. Other Courses. Students in the program will have an option to take one additional relevant lecture course, approved by the course directors.
3. Individual Tutorial. During the remainder of the time each student will be supervised by a faculty member participating in the program in a study project. It is believed that it would be most beneficial for a student to carry out a laboratory research project. Lectures and seminars have been planned so that students can spend at least five to six hours each day in the laboratory. In the case that the program directors would approve of a project of a different nature, the student again would be supervised by one of the participating faculty members. In a study project of this kind, a student might be expected to take more than one additional relevant course. Weight: 9 units per term.

Program Directors: Keene and Wilfert



ROSTER OF HOUSE STAFF BY DEPARTMENTS

Anesthesiology

Chief Resident: Roy D. Russell, M.D. (New York Med. Coll., 1977).

Senior Residents: Carol F. Adams, M.D. (Bowman Gray, 1982); Ralph P. Baker, M.D. (Duke, 1980); John I. Benet, M.D. (South Florida, 1981); Gerald A. Bushman, M.D. (Arkansas, 1981); Lloyd J. Faul, M.D. (Virginia, 1982); Anthony J. Fister, M.D. (Ohio, 1982); Robert F. Goad, M.D. (Creighton, 1973); H. David Hardman, M.D. (Minnesota, 1981); John V. Parham, Jr., M.D. (Mississippi, 1978); Thales N. Pavlatos, M.D. (Ohio State, 1980); Jane H. Sprague, M.D. (North Carolina at Chapel Hill, 1981); Gijbertus F. van Staveren, M.D. (State Univ. of Ghent, Belgium, 1982); Gregory J. Waters, M.D. (Michigan, 1978); William A. Wilson, M.D. (Wayne State, 1982).

Junior Residents: Sidney J. Bennett, M.D. (Far Eastern Univ. Med. School, Manila, Philippines, 1980); Steven M. Bird, M.D. (New Mexico, 1984); Gregory F. Brusino, M.D. (New York at Buffalo, 1983); Richard G. Burke, M.D. (Rochester, 1983); Steve A. Dubin, M.D. (Albert Einstein, 1983); John E. Elliott, M.D. (Cincinnati, 1983); Patricia M. Estok, M.D. (Miami, 1983); George E. Fant, M.D. (Tennessee, 1984); Gregory G. Hall, M.D. (Duke, 1983); Howard G. Hochman, M.D. (Miami, 1984); Holly G. Jense, M.D. (Albert Einstein, 1983); Keith D. Knopes, M.D. (Stanford, 1981); Gennard T. Lanzara, M.D. (Virginia, 1984); Deevide O. Miller, M.D. (Duke, 1983); Philip R. Mitchell, M.D. (Univ. of Cape Town, South Africa, 1980); Kevin D. Ossey, M.D. (Univ. of Cape Town, South Africa, 1981); Stephen J. Parrillo, M.D. (Univ. of Bologna, Italy, 1982); Edward T. Scruggs, M.D. (Alabama, 1983); Carleton A. Smith, M.D. (Wayne State, 1976).

Family Medicine

Chief Residents: Walter E. Broadhead, M.D. (Duke, 1982); Elizabeth A. Clardy, M.D. (Duke, 1982); Patsy F. Daniels, M.D. (North Carolina at Chapel Hill, 1982).

Residents: Hershey S. Bell, M.D. (Univ. of Toronto, 1982); Laura J. Booth, M.D. (New York at Buffalo, 1982); Ora N. Botwinick, M.D. (Mount Sinai, 1983); Kenneth L. Crutcher, M.D. (Duke, 1984); Amy R. Csorba, M.D. (Duke, 1984); H. Jackson Downey, M.D. (Florida, 1983); M. Patrice Eiff, M.D. (Wisconsin, 1983); Jonathan E. Fountain, M.D. (Florida, 1984); Glenn J. Fox, M.D. (Missouri, 1984); Bruce W. Goldberg, M.D. (Mount Sinai, 1982); William L. Gottesman, M.D. (Duke, 1983); William L. Harrison III, M.D. (Louisiana, 1979); Richard M. Hays, M.D. (Florida, 1983); Jane A. Higgins, M.D. (Missouri, 1982); James C. Hill, M.D. (North Carolina at Chapel Hill, 1984); Paul E. Jarris, M.D. (Pennsylvania, 1984); Suzanne Johannet, M.D. (Harvard, 1984); John G. King, M.D. (Rochester, 1984); Jonathan E. Klein, M.D. (New York at Syracuse, 1984); James D. Koren, M.D. (North Carolina at Chapel Hill, 1982); Michael J. Lemanski, M.D. (Massachusetts, 1983); Sandra J. Newton, M.D. (Wayne State, 1984); Jerome H. Nymberg, M.D. (Cincinnati, 1982); Coin T. Page, M.D. (North Carolina at Chapel Hill, 1983); Marc L. Rivo, M.D. (California at San Francisco, 1982); Devyani Sanders, M.D. (Mount Sinai, 1984); Jane Satter, M.D. (California at San Francisco, 1983); Annette L. Sobel, M.D. (Case Western Reserve, 1983); Simone S. Sommer, M.D. (George Washington, 1983); Kurt C. Stange, M.D. (Albany, 1983); Diane M. Stelzer, M.D. (Missouri, 1983); Albert A. Verrilli, M.D. (Case Western Reserve, 1984); Judith K. Visscher, M.D. (Washington, 1982); Lesa D. Walden, M.D. (Duke, 1983); Lawrence R. Wu, M.D. (Duke, 1982).

Fellows: James M. Finch, M.D. (South Florida, 1981); E. Yumi Shitama, M.D. (Maryland, 1981).

Medicine

Chief Residents: David L. Simel, M.D. (Duke, 1980); E. William St. Clair, M.D. (West Virginia, 1980).

Senior Assistant Residents: Michael B. Albert, M.D. (Johns Hopkins, 1982); James N. Barianuk, M.D. (Univ. of Manitoba, 1981); Christine G. Bounous, M.D. (Duke, 1982); E. Phillip Bounous, M.D. (Duke, 1980); G. Kent Chastain, M.D. (Tennessee, 1982); Paul R. Conkling, M.D. (Ohio State, 1982); Audrey P. Corson, M.D. (Colorado, 1982); Jean C. Evans, M.D. (Albany, 1981); F. Roosevelt Gilliam, M.D. (Duke, 1981); Mark L. Graham, M.D. (Mayo, 1982); Stuart I. Harris, M.D. (Duke, 1982); Stevan I. Himmelmanstein, M.D. (Tennessee, 1982); Dennis M. Israelski, M.D. (Albert Einstein, 1981); Mark M. Kowalski, M.D. (Kansas, 1981); Kenneth D. Kronhaus, M.D. (Pennsylvania, 1982); John P. Longabaugh, M.D. (Pittsburgh, 1982); Conor F. Lundergan, M.D. (Georgetown, 1982); M. Elizabeth McCarley, M.D. (Duke, 1982); Keith R. McCrae, M.D. (Duke, 1982); Gina L. Michael, M.D. (Duke, 1982); Gary W. Neal, M.D. (Tennessee, 1982); David A. Nichols, M.D. (Missouri, Columbia, 1982); Mark A. O'Rourke, M.D. (California at Los Angeles, 1982); Alvin C. Powell, M.D. (Tufts, 1982); Susan L. Pryor, M.D. (Med. Coll. of Wisconsin, 1982); John R. Raymond, M.D. (Ohio State, 1982); Mark E. Reese, M.D. (South Alabama, 1982); Harvey Serota, M.D. (Johns Hopkins, 1982); Hoke H. Shirley, M.D. (Tulane, 1982); Robert K. Stack, M.D. (Wayne State, 1981); Victor F. Tapson, M.D. (Hahnemann, 1982); Egerton K. van den Berg, M.D. (Duke, 1981); Thomas C. Wall, M.D. (Bowman Gray, 1982); Charles S. Wehbie, M.D. (Bowman Gray, 1982); Joel L. Weissfeld, M.D. (Johns Hopkins, 1981).

Junior Assistant Residents: Camille L. Bedrosian, M.D. (Harvard, 1983); Gail S. Belinsky, M.D. (North Carolina at Chapel Hill, 1983); Jonathan J. Berry, M.D. (Pennsylvania, 1983); David S. Borislow, M.D. (Johns Hopkins, 1983); Michael R. Cooper, M.D. (Duke, 1983); Karl G. Csaky, M.D. (Louisville, 1983); Ann W. Edmundson, M.D. (Univ. of Cambridge, 1982); Billy W. Evans, M.D. (Arkansas, 1983); L. Sue Frederick,

M.D. (Duke, 1983); Nick N. Garratt, M.D. (California at Irvine, 1983); Paul A. Gurbel, M.D. (Maryland, 1983); Robert H. Haber, M.D. (Mount Sinai, 1983); Paula K. Harland, M.D. (Duke, 1983); Robert C. Harland, M.D. (Duke, 1983); Margo E. Heath, M.D. (Utah, 1983); Donald L. Heine, M.D. (Johns Hopkins, 1983); Debra A. Heldman, M.D. (Ohio, 1983); William R. Herzog, M.D. (Duke, 1982); Michael B. Honan, M.D. (Alabama, 1983); Donald J. Jacob, M.D. (Ohio, 1983); Joan T. Jordan, M.D. (Duke, 1983); Peter A. Kaufman, M.D. (New York Univ., 1983); Virginia B. Kraus, M.D. (Duke, 1982); William E. Kraus, M.D. (Duke, 1982); Peter J. Mannon, M.D. (Boston, 1983); Kevin R. McConnell, M.D. (George Washington, 1983); Kenneth B. Newman, M.D. (Texas at Houston, 1983); Lina-Marie Obeid, M.D. (American Univ., Beirut, 1983); Christopher M. O'Connor, M.D. (Maryland, 1983); David C. Sane, M.D. (Duke, 1983); Elise E. Schriver, M.D. (Tennessee, 1983); Ronald A. Scott, M.D. (Texas at Houston, 1983); Robert F. Spurney, M.D. (Ohio, 1983); Theresa A. Travis, M.D. (Indiana, 1983); Jay S. Yadav, M.D. (West Virginia, 1983).

Interns: Augustine M. K. Choi, M.D. (Louisville, 1984); J. Thaddeus Coin, M.D. (Duke, 1984); Deirdre M. Collins, M.D. (Thomas Jefferson, 1984); James P. Daubert, M.D. (Jefferson, 1984); Thomas G. Fulgham, M.D. (Duke, 1983); Robb W. Glenny, M.D. (Virginia, 1984); Mark R. Hughes, M.D. (Baylor, 1984); Robert G. Kilbourn, M.D. (Texas at Houston, 1984); Jerome H. Kim, M.D. (Yale, 1984); David A. Knapp, M.D. (California at San Diego, 1984); Kirk U. Knowlton, M.D. (Utah, 1984); Sarah S. Kratz, M.D. (North Carolina at Chapel Hill, 1984); Amelia A. Langston, M.D. (Washington Univ., 1984); Richard L. Leff, M.D. (Yale, 1984); George C. Li, M.D. (Baylor, 1984); Gary R. Lichtenstein, M.D. (Mount Sinai, 1984); Douglas R. Martel, M.D. (Texas at San Antonio, 1984); Perry G. McLimore, M.D. (Louisville, 1984); Mark R. Milunski, M.D. (Albany, 1984); Charles K. Moore, M.D. (Washington Univ., 1984); Randall W. Moreadith, M.D. (Duke, 1984); Dexter L. Morris, M.D. (Baylor, 1984); Richard M. Mortensen, M.D. (Cornell, 1984); J. Brent Muhlestein, M.D. (Utah, 1984); Frank I. Navetta, M.D. (New York Med. Coll., 1984); James J. Onorato, M.D. (Case Western Reserve, 1984); Joel Picus, M.D. (Miami, 1984); Rolando D. Rodriguez, M.D. (South Florida, 1984); Maureen Ross, M.D. (Miami, 1984); Michael K. Silberman, M.D. (Duke, 1984); Sara E. Stoneburner, M.D. (Duke, 1983); Thomas F. Trahey, M.D. (Bowman Gray, 1984); John P. Uglietta, M.D. (Georgetown, 1984); Jeffery M. Vance, M.D. (Duke, 1984); Flordeliza S. Villanueva, M.D. (Boston, 1984); Marcellus A. Walker, M.D. (Illinois, 1984); Kevin B. Waters, M.D. (New Mexico, 1984); David K. Wright, M.D. (Med. Coll. of Virginia, 1984); Russell D. Yang, M.D. (Baylor, 1984).

Fellows: Richard D. Adamick, M.D. (Stanford, 1980); Robert E. Albright, M.D. (Pennsylvania, 1979); Robert P. Bauman, M.D. (Wayne State, 1977); Robert E. Beach, M.D. (Louisiana, 1979); Robert N. Belkin, M.D. (Cornell, 1980); Clark T. Bishop, M.D. (Utah, 1980); Joseph L. Blackshear, M.D. (Mayo, 1978); Stephen J. Brandt, M.D. (Emory, 1981); John M. Bray, M.D. (Miami, 1980); Gregory K. Buller, M.D. (Kansas, 1980); Stanley J. Bunas, M.D. (North Carolina at Chapel Hill, 1979); Michael R. Cairns, M.D. (Jefferson, 1980); Stephen D. Campbell, M.D. (Maryland, 1981); Eric B. Carlson, M.D. (Hahnemann, 1980); Peng-Sheng Chen, M.D. (National Taiwan, 1979); A. Alan Chu, M.D. (Duke, 1980); Cynthia Chua, M.D. (Duke, 1979); Thomas M. Coffman, M.D. (Ohio, 1980); Paul G. Colavita, M.D. (Bowman Gray, 1979); C. Christine Cox, M.D. (North Carolina at Chapel Hill, 1980); Louis C. DeMaria, M.D. (Jefferson, 1973); Stephen M. Denning, M.D. (Duke, 1980); Joan L. Drucker, M.D. (Virginia, 1980); Basim Dubaybo, M.D. (American Univ., Beirut, 1980); Robert A. Durr, M.D. (New York at Buffalo, 1980); Kenneth A. Ellenbogen, M.D. (Johns Hopkins, 1980); Russell W. Eyre, M.D. (Utah, 1981); Joseph V. Follett, M.D. (Alberta, 1981); Haywood G. France, M.D. (West Virginia, 1980); Gregory D. Gibbons, M.D. (West Virginia, 1979); Georgia L. Gilliam, M.D. (Univ. of Innsbruck, 1978); William L. Gluck, M.D. (Pittsburgh, 1979); G. Stephen Greer, M.D. (Arkansas, 1981); David L. Halsey, M.D. (Michigan, 1981); Karen K. Hamilton, M.D. (Stanford, 1979); Neil B. Hampson, M.D. (Washington, 1981); Yusuf A. Hannun, M.D. (American Univ., Beirut, 1981); Elizabeth A. Harden, M.D. (Duke, 1977); R. Mack Harrell, M.D. (North Carolina at Chapel Hill, 1979); Robert A. Harrell, M.D. (Johns Hopkins, 1980); Lowell L. Hart, M.D. (New York, Upstate, 1980); Robert A. Havard, M.D. (California at Los Angeles, 1980); Ann Haviland, M.D. (Wayne State, 1980); M. Linda Hawes, M.D. (North Carolina at Chapel Hill, 1980); Elizabeth Henke, M.D. (Welsh National School of Med., 1976); Tomoaki Hinohara, M.D. (Keio Univ., 1975); Pamela J. Honeycutt, M.D. (Duke, 1981); Nancy Hooyman, M.D. (St. Louis, 1977); Robert F. Hunter, M.D. (Puerto Rico, 1978); Judie L. Hurwitz, M.D. (Albert Einstein, 1981); Frederick S. Jones, M.D. (Rush, 1979); Joanne M. Jordan, M.D. (Johns Hopkins, 1981); David L. Kaplan, M.D. (Bowman Gray, 1981); Dennis Karounos, M.D. (Kentucky, 1980); G. Neal Kay, M.D. (Michigan, 1979); G. Wallace Kernodle, M.D. (North Carolina at Chapel Hill, 1981); Mary E. Klotman, M.D. (Duke, 1980); Brian K. Kolbilka, M.D. (Yale, 1981); Jack Krafchek, M.D. (Melbourne, 1975); David A. Krendel, M.D. (Hahnemann, 1980); Gunther J. Lallinger, M.D. (Univ. of Munich, 1972); Andrew J. Laster, M.D. (Johns Hopkins, 1979); Kathryn J. Lucas, M.D. (North Carolina at Chapel Hill, 1980); Anne Marchese, M.D. (Columbia, 1979); Daniel B. Mark, M.D. (Tufts, 1978); David B. Matchar, M.D. (Maryland, 1980); Mary F. Maturi, M.D. (Northwestern, 1978); Rex M. McCallum, M.D. (Vanderbilt, 1980); Lila T. McConnell, M.D. (Georgetown, 1976); Linville M. Meadows, M.D. (North Carolina at Chapel Hill, 1982); J. Randall Moorman, M.D. (Mississippi, 1978); Elliot M. Morris, M.D. (Rensselaer Polytech. Instit., 1980); Pamela B. Morris, M.D. (Duke, 1981); Michael N. Neuss, M.D. (Duke, 1979); Chalmers M. Nunn, M.D. (Duke, 1980); William O'Callaghan, M.D. (Univ. Coll., Dublin, 1977); Gregg A. Olsen, M.D. (Utah, 1980); Mark A. O'Rourke, M.D. (California at Los Angeles, 1982); Douglas L. Packer, M.D. (Utah, 1980); William M. Parks, M.D. (Iowa, 1978); Jacqueline A. Pugh, M.D. (Texas at San Antonio, 1981); L. Darryl Quarles, M.D. (Alabama, 1979); Kate T. Queen, M.D. (North Carolina at Chapel Hill, 1981); James E. Ramage, M.D. (Duke, 1981); Norman M. Ramirez, M.D. (Stanford, 1981); Wayne K. Ruth, M.D. (Duke, 1978); Norman Sadick, M.D.

(Univ. of New South Wales, 1973); Wayne M. Samuelson, M.D. (Utah, 1980); David M. Schlossman, M.D. (Duke, 1979); Charles A. Simonton, M.D. (Harvard, 1980); Anthony L. Sintetos, M.D. (Georgetown, 1981); Maryella D. Sirmon, M.D. (South Alabama, 1978); Deborah S. Skelton, M.D. (Mississippi, 1981); Thomas N. Skelton, M.D. (Mississippi, 1981); P. Travis Smith, M.D. (Utah, 1980); Dennis L. Sprecher, M.D. (Boston, 1978); Stephanie A. Studenski, M.D. (Kansas, 1979); Martin J. Sullivan, M.D. (Ohio State, 1980); Fred J. Thaler, M.D. (Washington, 1980); Pierre L. Triozzi, M.D. (Ohio, 1980); Humberto Vidaillet, M.D. (Oklahoma, 1981); Shawnee Weir, M.D. (Minnesota, 1980); Robert F. Wekman, M.D. (Jefferson, 1980); J. Marcus Wharton, M.D. (Vanderbilt, 1980); Melinda Wharton, M.D. (Harvard, 1980); Harry White, M.D. (Med. Coll. of Virginia, 1981); Rita M. Willett, M.D. (Washington Univ., 1980).

DIVISION OF DERMATOLOGY

Lester J. Fahrner, M.D. (Illinois, 1979); Barry J. Kuttner, M.D. (New York, Downstate, 1982); Virginia Lightner, M.D. (Duke, 1982); Christopher A. Moeller, M.D. (Iowa, 1983); Anamari Pestana, M.D. (Miami, 1983); William S. Sawchuck, M.D. (Michigan, 1981); Walter W. Weed, M.D. (Arkansas, 1982); Raymond H. Welch, M.D. (Albany, 1981).

DIVISION OF NEUROLOGY

Mark J. Alberts, M.D. (Tufts, 1982); Michael H. Bowman, M.D. (Ohio, 1976); Peter R. H. Clarke, M.D. (Michigan, 1983); Nancy L. Earl, M.D. (North Carolina at Chapel Hill, 1982); Lewis M. Fredane, M.D. (Albert Einstein, 1979); Joel Greenberg, M.D. (Miami, 1981); Steven J. Greenberg, M.D. (New York, Downstate, 1975); Marian F. Griffiths, M.D. (Tufts, 1982); David A. Hosford, M.D. (Emory, 1983); Daniel J. Howley, M.D. (Temple, 1979); Peter W. Kaplan, M.D. (St. Bartholomews Hosp. Med. Coll., 1977); Jonathan Orwitz, M.D. (Pittsburgh, 1981); Donald J. Solomon, M.D. (Stanford, 1981).

Obstetrics and Gynecology

Chief Residents: Dale Bearman, M.D. (Tufts, 1981); Neeoo Chin, M.D. (Ohio State, 1981); David Henderson, M.D. (Med. Coll. of Virginia, 1981); Claude Hughes, M.D., Ph.D. (Duke, 1976); Joanne Piscitelli, M.D. (Duke, 1980); James Rice, M.D. (California at San Diego, 1981).

Assistant Residents: Christin Babcock, M.D. (North Carolina at Chapel Hill, 1983); Theodore Blaszczuk, M.D. (Northwestern, 1983); Henry Easley, M.D. (North Carolina at Chapel Hill, 1982); Wesley Hambricht, M.D. (Duke, 1982); MaryLee Howell, M.D. (Vanderbilt, 1984); Bradley Hurst, M.D. (Texas at Houston, 1984); Bruce Lessey, M.D., Ph.D. (Colorado, 1984); Paul Marshburn, M.D. (Emory, 1984); Joyce McKenney, M.D. (Washington, 1982); Deborah Metzger, M.D. (Texas, 1982); George Olt, M.D. (Cincinnati, 1984); Dwight Pridham, M.D. (California at San Diego, 1983); Elizabeth Raymond, M.D. (Columbia, 1984); John Schmitt, M.D. (Texas at San Antonio, 1983); Vernon Stringer, M.D. (Duke, 1982); Chrystie Timmons, M.D. (North Carolina at Chapel Hill, 1982); Roger Young, M.D. (North Carolina at Chapel Hill, 1982); L. Lewis Wall, M.D. (Kansas, 1983).

Ophthalmology

Chief Residents on rotating basis.

Residents: David Browning, M.D. (St. Louis, 1978); Reginald Ishman, M.D. (Duke, 1981).

Assistant Residents: Andrew Antoszyk, M.D. (New York Med. Coll., 1983); Jonathan Christenberry, M.D. (Duke, 1980); Edward K. Isbey III, M.D. (North Carolina at Chapel Hill, 1981); Hugh Jellie, M.D. (Univ. of W. Ontario, 1980); Cathryn Karlin, M.D. (Cornell, 1983); James Lewis, M.D. (Jefferson, 1977); Miguel Lugo, M.D. (Temple, 1981); Bettina B. Meekins, M.D. (Miami, 1978); David Robinson, M.D. (Duke, 1983); George Rosenwasser, M.D. (Miami, 1983); George Rozakis, M.D. (Cornell, 1982); Raymond Shelton, M.D. (Duke, 1982); Edward A. Tsoy, M.D. (Maryland, 1979); Keye L. Wong, M.D. (Rush, 1982).

Pathology

Residents: Douglas C. Anthony, M.D., Ph.D. (Duke, 1984); Gerald Campbell, M.D., Ph.D. (Texas Southwestern, 1977); Thomas B. Clark III, M.D. (South Carolina, 1983); Georgette A. Dent, M.D. (Duke, 1981); Craig E. Elson, M.D. (Michigan, 1983); Raymond B. Franklin, M.D., Ph.D. (Texas, 1981, 1978); James Furlong, M.D. (Michigan, 1981); Stephen Gonias, M.D., Ph.D. (Duke, 1984); Linda D. Glaubitz, M.D. (Duke, 1982); Randall Harris, M.D. (Nebraska, 1983), Ph.D. (North Carolina State University, 1974); Maureane R. Hoffman, M.D., Ph.D. (Iowa, 1982); David Howell, M.D. (Duke, 1984), Ph.D. (Duke, 1982); Peter Humphrey, M.D. (Kansas, 1984), Ph.D. (Kansas, 1983); Robert Kinney, M.D. (Duke, 1981); Janet Kolbeck, M.D. (Emory, 1982); Marcia Adams Lucas, M.D., Ph.D. (Duke, 1984); Kevin McCormack, M.D. (Michigan, 1983), Ph.D. (Michigan, 1979); Sara B. McEwen, M.D. (Tulane, 1983); Roger McLendon, M.D. (Med. Coll. of Georgia, 1982); Stephen Mullins, M.D. (Georgia, 1982); Reinhardt Sahmel, M.D., Ph.D. (Duke, 1981); Mark W. Scroggs, M.D. (Duke, 1984); Mark Shifman, M.D. (Ohio, 1978), Ph.D. (Duke, 1983); John Sorge, M.D. (Rochester, 1982); Joseph A. Tucker, M.D. (Vanderbilt, 1981); Paul N. Valenstein, M.D. (Illinois, 1981); Stephanie Wain, M.D. (Duke, 1982).

Fellows: Mitchel Bauman, M.D. (Nebraska, 1982); Kenneth J. Friedman, M.D. (Downstate Med. Center, 1981); Peter Kolbeck, M.D. (Emory, 1982); Matthew Perry, M.D. (Miami, 1980); John A. Wolfe, M.D. (Michigan, 1980).

Pediatrics

Chief Resident: Verena Jorgensen, M.D. (Duke, 1981).

Third Year Residents: Peter Anderson, Ph.D. (New York City Univ., 1979), M.D. (Mount Sinai, 1981); Tarek Bisat, M.D. (American Univ., Beirut, 1981); Michael Clayton, M.D. (New Mexico, 1982); Susan Desman, M.D. (McGill, 1982); Martha Gagliano, M.D. (Duke, 1982); Craig Hurwitz, M.D. (Southwestern at Dallas, 1982); Vince Kopp, M.D. (North Carolina at Chapel Hill, 1982); Stewart Lawrence, M.D. (Mt. Sinai, 1982); David Smalley, M.D. (Alabama, 1982); Mary Ann Zetes, M.D. (Dartmouth, 1982).

Second Year Residents: Jan Broadbent, M.D. (Utah, 1983); Kim Haltiwanger, M.D. (North Carolina at Chapel Hill, 1983); Peter Kinnebrew, M.D. (Alabama, 1983); Donald Ludlow, M.D. (Hahnemann, 1983); Rajesh Malik, M.D. (Sheffield, England, 1981); Elena Marin, M.D. (Boston, 1983); Charles Morrow, M.D. (Missouri, 1983); Randa Reitman, M.D. (Brown, 1983); Lynn Sheets, M.D. (Kansas, 1983); Karen St. Claire, M.D. (Texas at Galveston, 1982); Virgil Steele, M.D., Ph.D. (Washington, 1979); Kathryn Thrailkill, M.D. (Ohio, 1983).

First Year Residents: Raymond Chan, M.D. (New York at Buffalo, 1984); Ronald Dahl, M.D. (Pittsburgh, 1984); Eugene Freid, M.D. (Chicago, 1984); Carla Jacobson, M.D. (Connecticut, 1984); Fred Kern, M.D. (McGill, 1984); Nicholas Lynn, M.D. (Ohio State, 1984); Richard Mims, M.D. (South Carolina, 1984); Adrian Sandler, M.D. (Cambridge, England, 1984); Rashmin Savani, M.B.Ch.B. (Sheffield, England, 1982); Laura Schanberg, M.D. (Duke, 1984); Gregg Semenza, M.D., Ph.D. (Pennsylvania, 1984); Monica Shelton, M.D. (North Carolina at Chapel Hill, 1984); Katherine Turlington, M.D. (South Florida, 1984).

Fellows: Marilyn Alley, M.D. (North Carolina at Chapel Hill, 1958); I. H. Bangash, M.B.B.S. (Khyber, Pakistan, 1974); David Becton, M.D. (Arkansas, 1979); Timothy Bohan, M.D., Ph.D. (Miami, 1980); Wesley Burks, M.D. (Arkansas, 1980); Sara Chafee, M.D. (Dartmouth, 1980); Alan Cougle, M.D. (Louisiana State, 1972); Hugh Craft, M.D. (North Carolina at Chapel Hill, 1979); Robert Drucker, M.D. (Duke, 1979); John Eckerd, M.D. (Bowman Gray, 1969); Stephen Epps, M.D. (South Florida, 1979); Patricia Ghory, M.D. (Cincinnati, 1980); James Grant, M.D. (Duke, 1980); Pamela Griffin, M.D. (Mississippi, 1978); Ilana Harmon, M.D. (Hadassah, Israel, 1975); John Holtkamp, M.D. (New York Univ., 1980); Dana Ketchum, M.D. (Tulane, 1979); Frederick Leickly, M.D. (Case Western Reserve, 1980); Louise Markert, M.D., Ph.D. (Duke, 1982); Ross McKinney, M.D. (Rochester, 1979); Michael O'Shea, M.D. (North Carolina at Chapel Hill, 1980); Kapil Rawal, M.D. (Armed Forces Med. Coll., Poona, India, 1976); Joseph Roberts, M.D. (Emory, 1981); Wilson Rocha, Jr., M.D. (Minas Gerais, Belo Horizonte, Brazil, 1981); Larry Williams, M.D. (Duke, 1977).

Psychiatry

Chief Residents: Jack Barber, M.D. (Texas at San Antonio, 1981); Mark Miller, M.D. (New York at Stony Brook, 1981); Roy Stein, M.D. (Duke, 1980).

Residents: Carl Anderson, M.D. (Cornell, 1983); Diana Antonacci, M.D. (Southern Illinois, 1982); Stephen Barnes, M.D. (Duke, 1980); Phillip Chappell, M.D. (North Carolina at Chapel Hill, 1984); Caron Christison, M.D. (California at San Diego, 1982); George Christison, M.D. (California at San Diego, 1982); Lindsay Clarkson, M.D. (Duke, 1978); Sandra Cohen, M.D. (New York, 1978); Scott Cunningham, M.D. (Duke, 1981); Rodney Deaton, M.D. (Indiana, 1982); Wayne Denton, M.D. (Chicago, 1982); Marc-Andre Domken, M.D. (Catholic Univ. of Louvain, Brussels, 1982); Lawrence Dunn, M.D. (Michigan, 1984); Edward Eisenberg, M.D. (Univ. of Miami, 1982); Marc Feldman, M.D. (Dartmouth, 1984); Edward Goldenberg, M.D. (Kentucky, 1981); Veerinder Goli, M.D. (Osmania Med. Coll., 1978); Candis Grace, M.D. (Duke, 1981); Thomas Gresalfi, M.D. (Columbia, 1983); Grant Halischuk, M.D. (McGill, 1983); Caroline Haynes, M.D. (Duke, 1983); Michael Hertzberg, M.D. (North Carolina at Chapel Hill, 1984); Charles Hofbauer, M.D. (Wayne State, 1980); D. Randall Johnson, M.D. (South Carolina, 1983); Pem Kahler, M.D. (North Carolina at Chapel Hill, 1980); Kalavathi Kolappa, M.D. (Mandurai Med. Coll., 1979); Michael Larson, M.D. (Manila, 1979); Lu Ann Leidy, M.D. (Duke, 1982); Michael Marchese, M.D. (Columbia, 1982); Richard Marciniak, M.D. (Michigan, 1981); Francisco Marquez, M.D. (Univ. Autonomus of Chihuahua, 1978); Jaqueline Maus, M.D. (Texas at Houston, 1983); William V. McCall, M.D. (Duke, 1984); William McDonald, M.D. (Duke, 1984); Keith Meador, M.D. (Louisville, 1982); Jan Neal, M.D. (Duke, 1982); Charles Nemeroff, M.D., Ph.D. (North Carolina at Chapel Hill, 1981); Merry Noel, M.D. (Tennessee, 1983); Bruce Noll, M.D. (Temple, 1982); Mindy Oshrain, M.D. (Duke, 1982); Roger S. Perilstein, M.D. (Temple, 1982); Gary Plotke, M.D. (Washington Univ., 1983); Dennis Porter, M.D. (North Carolina at Chapel Hill, 1982); Magdalena Raczowska, M.D. (Warsaw Med. Coll., 1976); Krishnaiah Rayasam, M.D. (Andhra Med. Coll., 1973); Gigi Russell, M.D. (Louisville, 1980); Frank Shelp, M.D. (Med. Coll. of Virginia, 1984); Kim Sherrill, M.D. (Texas, 1980); Margaret Ann Shugart, M.D. (Med. Coll. of Virginia, 1984); David Smith, M.D. (Alabama, 1980); Mark Smith, M.D. (California at San Diego, 1984); Nathan Strahl, M.D. (North Carolina at Chapel Hill, 1983); David Susco, M.D. (Pennsylvania, 1983); Sam Thielman, M.D. (Duke, 1980); Anne Tyson, M.D. (North Carolina at Chapel Hill, 1981); Marcia Valenstein, M.D. (Illinois, 1981); Ronald Vereen, M.D. (Duke, 1981); Joel Vogt, M.D. (Texas A&M, 1981); Michael Webb, M.D. (Texas at San Antonio, 1981); Mary Catherine

Wimer, M.D. (Texas at Galveston, 1982); Floyd Wiseman, M.D. (Texas at Houston, 1982); Katherine Wu, M.D. (Duke, 1982); James Zakris, M.D. (Louisiana, 1983).

Radiology

Residents: George Adams, M.D. (North Carolina at Chapel Hill, 1981); Mitchell Anscher, M.D. (Virginia, 1981); Frank Berkowitz, M.D. (New York, 1983); Vickie Camerino, M.D. (Columbia, 1983); Arthur Castagno, M.D. (Pennsylvania, 1980); Timothy Clark, M.D. (Duke, 1981); Ella Doo, M.D. (Pennsylvania, 1978); Diane Edge, M.D. (Dartmouth, 1982); David Enterline, M.D. (North Carolina at Chapel Hill, 1982); Peter Fedyshin, M.D. (Hershey, 1976); Alan Fein, M.D. (Columbia, 1978); Mark Finkel, M.D. (Albert Einstein, 1983); Evan Fram, M.D. (Duke, 1982); William Gallmann III, M.D. (Tulane, 1980); George Gamba, M.D. (Indiana, 1982); Janet Garrett, M.D. (Cornell, 1983); Steven Genkins, M.D. (Columbia, 1980); Bruce Hershatter, M.D. (Indiana, 1982); Barbara Hertzberg, M.D. (Duke, 1980); Bennett Hollenberg, M.D. (Indiana, 1981); Peter Janick, M.D. (Duke, 1982); Carlton Jenkins, M.D. (North Carolina at Chapel Hill, 1983); Ruben Kier, M.D. (Duke, 1982); Gerald Lourie, M.D. (Duke, 1981); Philip Marino, M.D. (Duke, 1983); Shaheda Maroof, M.D. (India, 1977); Leonard Mastrodomenico, M.D. (New Jersey, 1980); Philip Moeser, M.D. (Wisconsin, 1980); Dale Nance, M.D. (Baylor, 1976); Mark Osborne, M.D. (Chicago, 1981); Bryan Peters, M.D. (Duke, 1981); Bruce Phillips, M.D. (Florida, 1983); Rita Pink, M.D. (Illinois, 1978); Charles Pope, M.D. (North Carolina at Chapel Hill, 1976); Claire Poyet, M.D. (Duke, 1981); Matthew Ralston, M.D. (Duke, 1981); Richard Satre, M.D. (Wisconsin, 1982); Peter Saviteer, M.D. (Connecticut, 1980); Michael Shanks, M.D. (Michigan, 1983); Tony Smith, M.D. (East Carolina, 1981); Janet Szabo, M.D. (North Carolina at Chapel Hill, 1979); Julie Takasugi, M.D. (California at Los Angeles, 1982); David Tamas, M.D. (Georgia, 1982); Rebecca Tarlton, M.D. (Western Ontario, 1978); Charles Thomas, M.D. (North Carolina at Chapel Hill, 1970); Jefferson Trupp, M.D. (Florida, 1980); Harlan Vingan, M.D. (New York, Downstate, 1983); Diana Voorhees, M.D. (Pennsylvania, 1981); Linda Wellner, M.D. (Pennsylvania, 1976); William Woodruff, M.D. (Duke, 1982); Robert Yankes, M.D. (Pittsburgh, 1982); Charles Yeager, M.D. (Alabama, 1974).

Surgery

DIVISIONS OF GENERAL AND CARDIO-THORACIC SURGERY

Instructors and Teaching Scholars: Erle H. Austin, M.D. (Harvard, 1974); Ronald C. Hill, M.D. (West Virginia, 1974); Robert N. Jones, M.D. (Rush, 1976); James D. Sink (Bowman Gray, 1975).

Instructors and Chief Residents: Gary K. Lofland, M.D. (Boston, 1975); Craig O. Olsen, M.D. (Utah, 1976); Bruce D. Schirmer, M.D. (Duke, 1978); Peter M. Thurlow, M.D. (Harvard, 1977); Peter Van Trigt III, M.D. (Tulane, 1977); J. Mark Williams, M.D. (Duke, 1976).

Research Fellows: Bert A. Bowers, M.D. (Iowa, 1982); Ying-Fu Chen, M.D. (Kaohsiung Med. Coll., 1973); Thomas D. Christopher, M.D. (Duke, 1982); C. William Cole, M.D. (Dalhousie Univ., 1974); Jacques P. Goldstein, M.D. (Univ. of Brussels, 1978); Michele I. Hensley, M.D. (Duke, 1982); Stuart J. Knechtle, M.D. (Cornell, 1982); S. Chace Lottich, M.D. (Duke, 1981); David M. Mahvi, M.D. (South Carolina, 1981); George W. Maier, M.D. (Duke, 1982); Raymond G. Makhoul, M.D. (Chicago, 1982); James J. Morris, M.D. (Duke, 1981); Charles E. Murphy, M.D. (Duke, 1982); Kevin O'Malley, M.B.B.S. (University College, Dublin, 1977); Vito A. Mantese, M.D. (St. Louis, 1982); Francis S. Rotolo, M.D. (Michigan, 1981); David Salter, M.D. (Univ. of Toronto, 1974); Raymond Silva, M.D. (California, 1979); Kent W. Small, M.D. (Tulane, 1981); Hiroshi Takei, M.D. (Nippon Med. School, 1977); Huasheng Xu, M.D. (Zhongshan Med. Coll., 1970).

Senior Assistant Residents: Ralph J. Damiano, M.D. (Duke, 1980); James M. Douglas, Jr., M.D. (Duke, 1978); Thomas B. Ferguson, M.D. (St. Louis, 1979); Richard D. Floyd, M.D. (Duke, 1978); Donald Glower, M.D. (Johns Hopkins, 1980); William L. Holman, M.D. (Cornell, 1978); Warren J. Kortz, M.D. (Colorado, 1979); John F. Lucas III, M.D. (Duke, 1981); Thomas L. Novick, M.D. (Duke, 1978); Richard J. Peterson, M.D. (Mayo, 1979); Robert B. Peyton, M.D. (New York, 1977); Douglas S. Reintgen, M.D. (Duke, 1979); Stephen K. Rerych, M.D. (Columbia, 1974); Laurence H. Ross, M.D. (Case Western Reserve, 1979); Peter K. Smith, M.D. (Duke, 1977); John A. Spratt, M.D. (Washington Univ., 1980); George S. Tyson, Jr., M.D. (Duke, 1977); Ross M. Ungerleider, M.D. (Rush, 1976); Walter B. Vernon, M.D. (Harvard, 1980).

Assistant Residents: William C. Buhrman, M.D. (Duke, 1983); Robin G. Cummings, M.D. (Duke, 1982); Daniel M. Estok II, M.D. (Miami, 1983); James W. Gaynor, M.D. (South Carolina, 1982); John H. Gerhard, M.D. (Harvard, 1981); Lynne O. Geweke, M.D. (Wisconsin, 1983); Reginald L. Hall, M.D. (Duke, 1983); Robert W. Leyen, M.D. (Tennessee, 1977); Nancy A. Little, M.D. (Jefferson, 1983); Herbert K. Lyerly, M.D. (California, 1983); Robert L. Murrach, M.D. (Duke, 1983); James E. Nitka, M.D. (Arizona, 1983); Andrew R. Scott, M.D. (Kansas, 1983); Joseph D. Siefker, M.D. (Louisiana, 1983); David C. Urquia, M.D. (Virginia, 1983); William G. Ward, M.D. (Duke, 1978); Christopher R. Watters, M.D. (Michigan, 1983); Daniel Whitley, Jr., M.D. (North Carolina at Greenville, 1983); Bruce E. Woodsworth, M.D. (East Tennessee, 1983).

First Year Residents: Howard R. Brown, M.D. (California, 1984); Ray H. Cameron, M.D. (Wisconsin, 1984); Angelo J. Colosimo, M.D. (New York, 1984); Samuel M. Currin, M.D. (South Carolina, 1984); Anurag K. Das, M.D. (Northwestern, 1984); Robert D. Davis, M.D. (California at Los Angeles, 1984); Gregory P. Fontana, M.D. (California at Los Angeles, 1984); Herbert E. Fuchs, M.D. (Duke, 1984); David H. Harpole, M.D. (Virginia, 1984); Thomas E. Jordan, M.D. (Maryland, 1984); Martin E. Kernberg, M.D. (Stanford,

1984); William J. Mallon, M.D. (Duke, 1984); David H. McCord, M.D. (Cornell, 1984); Michael J. McNamara, M.D. (Duke, 1984); William J. Murzic, M.D. (Tufts, 1984); Michael A. Skinner, M.D. (Rush, 1984); Craig L. Slingluff, Jr., M.D. (Virginia, 1984); Thomas C. Spangler, M.D. (North Carolina at Chapel Hill, 1984); John P. Thompson, M.D. (Duke, 1984); Mario Turi, M.D. (North Carolina at Greenville, 1984); Douglas J. Wermuth, M.D. (Wisconsin, 1984); Richard B. Williams, M.D. (Stanford, 1984).

DIVISION OF NEUROSURGERY

Instructors and Chief Residents: Stephen Saris, M.D. (Boston, 1979); Jeffrey S. Walker, M.D. (Texas at Houston, 1979).

Assistant Residents: Eben Alexander III, M.D. (Duke, 1980); Estrado Bernard, M.D. (Duke, 1983); Peter Bronec, M.D. (Duke, 1981); Susan G. Burlacoff, M.D. (Univ. of Toronto, 1981); John J. Moossy, M.D. (Tulane, 1980); Joseph H. Piatt, Jr., M.D. (Pennsylvania, 1979); Charles E. Rawlings, M.D. (Duke, 1982); Steven J. Schiff, M.D. (Duke, 1980); Eric D. Weber, M.D. (S.U.N.Y., 1981).

DIVISION OF ORAL SURGERY

Instructor and Chief Resident: William D. Fox, D.D.S., (Tennessee, 1977).

Assistant Residents: Thomas R. Cook, D.M.D. (Med. Coll. of Georgia, 1977); Clive B. Rayner, D.M.D. (Florida, 1981).

DIVISION OF ORTHOPAEDIC SURGERY

Instructors and Chief Residents: Samuel I. Brown, M.D. (Virginia, 1979); Paul B. Chaplin, M.D. (New York Med. Coll., 1979); Todd M. Chapman, M.D. (Bowman Gray, 1979); Gregg E. Cregan, M.D. (Jefferson, 1978); John E. Herzenberg, M.D. (Boston, 1979); Neville A. Lewis, M.D. (Cincinnati, 1976); Eric R. Oser, M.S. (Louisiana, 1979); Joseph F. Slade III, M.D. (Connecticut, 1979).

Assistant Residents: George S. Aitken, M.D. (Case Western Reserve, 1982); William C. Andrews, Jr., M.D. (Duke, 1980); David E. Attarian, M.D. (Duke, 1980); James B. Billys, M.D. (Jefferson, 1981); Kyle E. Black, Jr., M.D. (Bowman Gray, 1978); Michael J. Bolesta, M.D. (Missouri, 1981); William D. Caffrey, Jr., M.D. (Duke, 1982); James C. Califf, M.D. (Duke, 1981); Don A. Coleman, M.D. (Utah, 1979); Clinton B. Davis II, M.D. (Duke, 1981); Dennis P. Devito, M.D. (Washington Univ., 1980); Robert D. Francis, M.D. (Duke, 1977); Kevin J. Gassner, M.D. (Wisconsin, 1980); Peter W. Gilmer, M.D. (Virginia, 1980); Michael W. Hendricks, M.D. (Florida, 1981); Leo A. Kulick, M.D. (Case Western Reserve, 1981); L. Scott Levin, M.D. (Temple, 1982); Ralph A. Liebelt, M.D. (Case Western Reserve, 1982); Gary M. Lourie, M.D. (Duke, 1982); Jay D. Mabrey, M.D. (Cornell, 1981); Charles T. McCullough, M.D. (Vanderbilt, 1961); Gregory A. Mencion, M.D. (Duke, 1981); Hugh B. Morris, M.D. (Duke, 1981); Robert M. Peroutka, M.D. (Maryland, 1982); Theodore M. Pitts, M.D. (Yale, 1977); William J. Richardson, M.D. (Eastern Virginia, 1977); Eddie J. Whelan III, M.D. (Georgia, 1980); Joseph H. Wombwell, M.D. (Kentucky, 1980); Mark C. Yates, M.D. (Missouri, 1982).

Research Fellows: Kunio Ibaraki, M.D. (Niigata Univ. 1962); Pantelis Nicolaou, M.D. (Athens Univ., 1975).

DIVISION OF OTOLARYNGOLOGY

Instructors and Chief Residents: Berrylin J. Ferguson, M.D. (Duke, 1976); Bradford C. Winegar, M.D. (Texas Southwestern, 1980).

Assistant Residents: Robert A. Akins, M.D. (Arkansas, 1982); Fred Freedman, M.D. (Miami, 1981); John R. Gilmore, M.D. (Southwestern, 1981); James C. Martin, M.D. (Louisiana, 1982); Stuart C. Owens, M.D. (South Carolina, 1982); Keith D. Walvoord, M.D. (Texas Southwestern, 1982).

Research Fellow: Cameron Gillesie, M.D. (Virginia, 1974).

DIVISION OF PLASTIC AND MAXILLOFACIAL SURGERY

Instructors and Chief Residents: Guido P. Gutter, M.D. (Univ. of Zurich, 1977); Mark Manstein, M.D. (Pennsylvania, 1978); Alexander McArthur, M.D. (Jefferson, 1978).

Assistant Residents: Donald Hanna, M.D. (Wayne State, 1979); Dean Kleto, M.D. (Tennessee, 1979); Christopher Pederson, M.D. (Texas at Dallas, 1978); Richard Radocha, M.D. (Hahnemann, 1979); Gregory Ruff, M.D. (Michigan, 1978).

DIVISION OF UROLOGIC SURGERY

Instructors and Chief Residents: Fred E. Govier, M.D. (Nebraska, 1979); Cary N. Robertson, M.D. (Tulane, 1977); Anthony R. Stone, F.R.C.S. (Edinburgh Univ., 1972).

Assistant Residents: Rudy T. Andriani, M.D. (New York Med. Coll., 1981); Robert A. Bertram, M.D. (Kentucky, 1980); Michael W. Brown, M.D. (Northwestern, 1980); Stephen D. Campenella, M.D. (Jefferson, 1981); Michael I. Maggio, M.D. (Loyola, 1982); Robert D. Mino, M.D. (Georgetown, 1981); John A. Nesbitt II, M.D. (Louisville, 1980); Mark R. Susskind, M.D. (Duke, 1982); Kendall L. Wise, M.D. (Vanderbilt, 1982).

Research Fellows: Benad Goldwasser, M.D., Ph.D. (Tel Aviv, Israel, 1975); Essam Ibrahim, M.B., Ch.B. (Cairo Univ., 1977); Nagi F. Shalaby, M.B., Ch.B. (Ain Shams Univ., Egypt, 1977).

Class of 1985

Adams, Carol J. (Virginia Polytech. Inst.), Martinsville, Virginia
Alitz, Curtis J. (United States Military Academy), West Point, New York
Allen, Cathy M. (William and Mary), Brookline, Massachusetts
Atwater-Boyd, Susan K. (Duke), Blue Bell, Pennsylvania
Bannister, Carolyn F. (Elmhurst), Abbeville, South Carolina
Beck-Davis, Susan Ruth (Duke), Durham, North Carolina
Bernstein, Roslyn J. (Johns Hopkins), New York, New York
Bobman, Stuart A. (Duke), Lafayette Hill, Pennsylvania
Bousvaros, Athos (Williams), Slingerlands, New York
Bradford, Norman F. (Duke), Miami, Florida
Brown, Richard A. (Duke), Atlanta, Georgia
Capps, John L. (Wake Forest), Warrenton, North Carolina
Caruso, Joseph M. (Southern California), South Holland, Illinois
Chancellor, Karen (Memphis), Memphis, Tennessee
Chaney, Kathy Santoriello (Virginia Polytech. Inst.), West Mifflin, Pennsylvania
Chung, Sophia M. (Duke), Silver Spring, Maryland
Cornwell, Sarah B. (North Carolina at Chapel Hill), Valdeese, North Carolina
Crowley, Nancy (Wisconsin), Edina, Minnesota
Daft, Paula A. (Duke), Lafayette Hill, Pennsylvania
Deaton, David H. (Haverford), Hickory, North Carolina
Dickinson, Daniel J. (Virginia), Virginia Beach, Virginia
Doman, Kathleen A. (Duke), Asheboro, North Carolina
Dranoff, Glenn (Duke), Woodmere, New York
Drapkin, Meredith (Duke), Riverdale, New York
Dunkel, Ira J. (Johns Hopkins), Paramus, New Jersey
Ebeling, James G. (Haverford), Baltimore, Maryland
Eisenberg, Dorothy Baker (Pennsylvania), McAfee, New Jersey
Enright, Katherine A. (Kansas), Durham, North Carolina
Fearnow, Edgar C., III (Duke), Lancaster, Pennsylvania
Flanagan, William F. (Davidson), Lakeland, Florida
Freye, Christopher J. (Duke), Stonington, Connecticut
Friedman, Daniel B. (Amherst), Albuquerque, New Mexico
Frush, Donald P. (California at Davis), Los Gatos, California
Fuchs, Herbert E. (California at Los Angeles), Granada Hills, California
Gibbons, Virginia N. (Smith), Concord, Tennessee
Gray, John L. (Westminster), Lewisburg, Pennsylvania
Greenfield, Ruth A. (Duke), Durham, North Carolina
Gulevich, Steven J. (Stanford), Stanford, California
Harbury, Olin L. (Massachusetts Inst. of Tech.), Etna, New Hampshire
Hill, Joseph A., Jr. (Wake Forest), Burlington, North Carolina
Holcomb, Gerianne C. G. (Kent State), Cary, North Carolina
Hovis, John G. (Duke), Cary, North Carolina
Huot, Stephen J. (Saint Michael's), Bethesda, Maryland
Jackson, Mark D. (Wisconsin), Middleton, Wisconsin
Jenkins, Susan E. (Pennsylvania), Philadelphia, Pennsylvania
Jones, Elizabeth C. (Georgetown), Bethesda, Maryland
Jones, Vincent T. (United States Air Force Academy), Arapahoe, North Carolina
Kabas, John S. (North Carolina at Chapel Hill), Raleigh, North Carolina
Keppel, Kenneth P. (North Carolina at Chapel Hill), Hickory, North Carolina
King, Peter H. (Duke), Canton, Ohio
Kipnis, Robert J. (Brown), Clayton, Missouri
Kleiner, Jillian (Amherst), Larchmont, New York
Kliwer, Mark A. (Oberlin), Mt. Pleasant, South Carolina
Koch, Fred Daniel (Arizona), Phoenix, Arizona
Kurilla, Michael G. (California Inst. of Tech.), Trenton, New Jersey
Layton, Marcelle C. (Maryland), Baltimore, Maryland
Lehmann, Leslie E. (Harvard), New Woodstock, New York
Leonardy, Nicholas J. (Duke), Atlanta, Georgia
Levine, Pamela D. (Emory), Atlanta, Georgia
Lewis, William R., III (California at Davis), Carmel, California
Louden, Mark S. (Duke), Parkersburg, West Virginia
Maroon, Thomas J., Jr. (Duke), Wheeling, West Virginia
McFarland, Elizabeth J. (Northwestern), Wauwatosa, Wisconsin
Menick, Barry J. (Duke), Rockville, Maryland

Miller, Ann Calby (Duke), Midland, Michigan
 Mitchell, R. Brian (Duke), Columbus, Ohio
 Murray, Michael J. (Vanderbilt), Durham, North Carolina
 Mustoe, Thomas A. (Harvard), Covington, Virginia
 Myers, Margaret A. (Duke), Allison Park, Pennsylvania
 Newby, Stephanie F. (North Carolina State), Greensboro, North Carolina
 Nichols, Joni C. (Dartmouth), Oak Brook, Illinois
 Nichols, Stephen R. (Massachusetts Inst. of Tech.), Magnolia, Texas
 O'Donnell, Michael A. (Northwestern), Alexandria, Virginia
 Papanicolaou, Michael N. (Duke), Lighthouse Point, Florida
 Paulson, Erik K. (Colorado), Columbus, Ohio
 Perkins, Christopher M. (Lafayette), Darien, Connecticut
 Petruska, David B. (Georgetown), Wilmington, Delaware
 Pharr, Walter D. (Davidson), Greensboro, North Carolina
 Pierce, Lori J. (Pennsylvania), Philadelphia, Pennsylvania
 Pomper, Mark E. (Dartmouth), Wilmette, Illinois
 Porter, Kathleen L. (Wesleyan), Weston, Massachusetts
 Quinlivan, Evelyn Byrd (Med. Coll. of Virginia), Powhatan, Virginia
 Rabassa, Antonio E. (Georgetown), Key Biscayne, Florida
 Reid, Steven H. (North Carolina at Chapel Hill), Salisbury, North Carolina
 Reiser, Harvey J. (Michigan), Minnetonka, Minnesota
 Reynolds, Pamela Preston (Duke), Akron, Ohio
 Rossitch, Eugene, Jr. (North Carolina at Chapel Hill), Winston-Salem, North Carolina
 Rutherford, Robin Elizabeth (Duke), Chapel Hill, North Carolina
 Sherrier, Robert H. (Princeton), Brielle, New Jersey
 Shortridge, Beth Ann (Princeton), Atlanta, Georgia
 Sierra, Leslie C. (Duke), Miami, Florida
 Silverstein, Jonathan S. (Duke), Port Washington, New York
 Slater, Douglas K. (William and Mary), Cape Coral, Florida
 Slaughter, Shelley R. (Michigan), Raleigh, North Carolina
 Smalley, Walter E., Jr. (Emory and Henry), Kingsport, Tennessee
 Smith, Stephen R. (Dartmouth), Parkersburg, West Virginia
 Sobol, Warren M. (North Carolina at Chapel Hill), Wilmington, North Carolina
 Spain, Claire L. (Washington), Chicago, Illinois
 St. Peter, Robert F. (Kansas), Wichita, Kansas
 Stave, Gregg Martin (Massachusetts Inst. of Tech.), Manhasset Hills, New York
 Suh, Eall Joo (Smith), Morganton, North Carolina
 Takla, Medhat W. (North Carolina at Chapel Hill), Raleigh, North Carolina
 Taylor, Dean C. (United States Military Academy), Livonia, Michigan
 Taylor, Patrick Alan (Notre Dame), Miami Lakes, Florida
 Thompson, John P. (Duke), St. Petersburg, Florida
 Trellis, Dan R. (Brown), Pittsburgh, Pennsylvania
 Treseler, Catherine P. B. (Seattle), Durham, North Carolina
 Treseler, Patrick H. (Seattle), Seattle, Washington
 Tripathy, Debasish (Massachusetts Inst. of Tech.), New Orleans, Louisiana
 Tripp, Henry, Jr. (North Carolina at Chapel Hill), Greensboro, North Carolina
 Trippett, Tanya M. (Spelman), Mountain Home, Idaho
 Tsai, Joseph C. (Harvard), Rocky River, Ohio
 Umhau, Andrew N. (Davidson), Chevy Chase, Maryland
 Veronee, Charles D. (Charleston), Summerville, South Carolina
 Warner, Charles H. (Washington and Lee), Charlotte, North Carolina
 Weston, Brent W. (Duke), Durham, North Carolina
 Wiley, James F., II (Duke), Raleigh, North Carolina
 Willett, Ralph P. (Williams), Raleigh, North Carolina
 Windom, Hugh H. (Duke), Sarasota, Florida
 Winter, Thomas Charles, III (Duke), Springfield, Virginia
 Zeitler, Philip Scott (Amherst), Malden, Massachusetts

Class of 1986

Aldrich, Harry R. (Princeton), Flushing, New York
 Alster, Tina S. (Duke), Durham, North Carolina
 Amidon, Thomas A. (Duke), Advance, North Carolina
 Barboriak, Peter N. (Marquette), Wood, Wisconsin
 Barton, John W., III (Duke), Rocky River, Ohio
 Baum, Linda G. (Stanford), Shaker Heights, Ohio

Busak, William L. (Cornell), Gloversville, New York
 Bernhardt, Peter F. (Massachusetts Inst. of Technology), Dedham, Massachusetts
 Bolick, David R. (Brigham Young), Provo, Utah
 Branum, Gene D. (Austin), Tyler, Texas
 Burke, Deborah M. (Florida), Durham, North Carolina
 Buse, John B. (Dartmouth), Charleston, South Carolina
 Carle, Kenneth A. (Hobart), Geneva, New York
 Chen, Allen R. S. (Dartmouth), Lexington, Massachusetts
 Chen, Anthony L. (Michigan), Ann Arbor, Michigan
 Coles, Neavelle A., Jr. (Johns Hopkins), Lanham, Maryland
 Collier, Thomas F. (Cornell), Closter, New Jersey
 Craig, Kendra A. (Michigan), Anchorage, Alaska
 Crone, Wilson (Duke), Charleston, South Carolina
 Crowell, Bradford A., Jr. (Pennsylvania), Hollywood, Florida
 Darwin, Robert H. (Duke), Plainfield, New Jersey
 DeWeese, Gary K. (Duke), Graham, North Carolina
 Dorman, Bruce H., Jr. (Duke), Durham, North Carolina
 Dresser, Michael (Duke), Davidson, North Carolina
 Drexler, Karen Glaze (Georgia Instit. of Tech.), Doraville, Georgia
 Duffy, Patrick (United States Military Academy), Hampton, Virginia
 Ellenby, Martin I. (Illinois), Skokie, Illinois
 Fabian, Michael A. (Hamilton), Vestal, New York
 Fawcett, Thomas A. (Massachusetts Inst. of Technology), Wrightsville Beach, North Carolina
 Feldman, Steven R. (Chicago), Silver Spring, Maryland
 Feldmesser, Marta L. (Radcliffe), Woodmere, New York
 Fisher, Bret L. (Duke), Winter Park, Florida
 Forsberg, David A. (Princeton), Wyckoff, New Jersey
 Fowler, Walter E. (Duke), Durham, North Carolina
 Friedberg, Richard C. (Stanford), Longboat Key, Florida
 Fritz, Russell C. (Duke), Clark, New Jersey
 Furr, William S. (North Carolina State), Mint Hill, North Carolina
 Gates, Lawrence K., Jr. (Utah State), Logan, Utah
 Gellman, Randy L. (Northwestern), Mooresville, North Carolina
 Gibson, James B. (California at Davis), San Francisco, California
 Gilbertson, John R. II (Massachusetts Instit. of Tech.), Lynnfield, Massachusetts
 Givens, Kerry T. (Bucknell), Harrisburg, Pennsylvania
 Glasson, Sandra E. (Virginia), Charlottesville, Virginia
 Glover, Gregory J. (Harvard), Blythewood, South Carolina
 Gonzalez, Alexander E. (Duke), Durham, North Carolina
 Gore, Margaret (Harvard), Birmingham, Alabama
 Grady, Tana A. (Howard), Teaneck, New Jersey
 Green, Richard M. (Duke), Flossmoor, Illinois
 Haleem, Azeem S. (Duke), London, Ohio
 Hamilton, Karen S. (Pittsburgh), Beaver Falls, Pennsylvania
 Harvill, Paul G. (Texas A. & M.), Garland, Texas
 Haverly, Karen Prifty (Duke), Naugatuck, Connecticut
 Hern, Deborah S. (Franklin and Marshall), Lancaster, Pennsylvania
 Hillman, David S. (Yale), Columbus, Ohio
 Hjelmstad, Russell (Colorado), Englewood, Colorado
 Hosford, Sandra Burson (Agnes Scott), Carrollton, Georgia
 Howard, Joseph F. (Duke), Rockville, Maryland
 Howell, Scott T. (Washington and Lee), Chester, Virginia
 Hoyt, David J. (Fairfield), Stratford, Connecticut
 Hulka, Carol A. (Brown), Chapel Hill, North Carolina
 Johnson, Janice D. (Loyola), Upper Marlboro, Maryland
 Johnson, Michael E. (Brigham Young), Mesa, Arizona
 Johnson, Scott H. (Emory), St. Louis, Missouri
 Jones, Claudia K. (Duke), Durham, North Carolina
 Kallianos, John A. (North Carolina at Chapel Hill), Clyde, North Carolina
 Kerr, Lindsey U. (Duke), Brookline, Massachusetts
 Kiernan, David C. (Duke), Key Biscayne, Florida
 Koenig, Daniel W. (Duke), Potomac, Maryland
 Kubek, Robert J. (Miami), Cleveland, Ohio
 Laforet, Genevieve (Harvard/Radcliffe), Chestnut Hill, Massachusetts
 Lambert, Thomas L. (Brigham Young), Fairfax, Virginia
 Leiser, Jeffrey D. (Harvard), Englewood, California

Lindegren, Mary Lou (Duke), Riverside, Connecticut
 Loback, David H. (Bucknell), York, Pennsylvania
 Long, Joseph B. (Duke), Kingsport, Tennessee
 Lyon, Robert K. (Duke), Westfield, New Jersey
 Madden, John F. (Amherst), New Britain, Connecticut
 Martin, Barbara (Duke), Cary, Illinois
 McAdams, Holman P. (North Carolina State), Greensboro, North Carolina
 McDonough, Robert S. (Texas), Bloomington, Minnesota
 McGough, James J. (Gettysburg), Durham, North Carolina
 Merritt, Kathy A. (Duke), Durham, North Carolina
 Mills, Anthony M. (Duke), Columbia, South Carolina
 Minor, Robert L., Jr. (Duke), Rocky Mount, North Carolina
 Moore, Lucy D. (Georgetown), Littleton, Colorado
 Morgan, Bruce K. (Duke), Raleigh, North Carolina
 Moskaluk, Christopher A. (Illinois), Midlothian, Illinois
 Murry, Charles E. (North Dakota), Bismarck, North Dakota
 Nelson, Stanley F. (Michigan), Englewood, Colorado
 Patel, Dhavalkuma D. (Duke), Charlotte, North Carolina
 Ping, Andrew C. (Brown), Athens, Ohio
 Preiss, Jennifer E. (California at Berkeley), Davis, California
 Query, Charles C., Jr. (Duke), Kannapolis, North Carolina
 Rajagopalan, Shrinivas (Harvard), Durham, North Carolina
 Raskauskas, Paul A. (Harvard), South Boston, Massachusetts
 Reiner, Steven L. (Haverford), Utica, New York
 Roberts, Kathleen T. (Georgia), Columbus, Georgia
 Rosemond, Richard L. (Duke), Sanford, Florida
 Rosenberg, Mark R. (Duke), Gastonia, North Carolina
 Ruh, Jennifer M. (Dartmouth), Orchard Park, New York
 Saltz, Joel (Michigan), Detroit, Michigan
 Schmidt, David M. (Northwestern), Cascade, Wisconsin
 Sheffield, Cedric D. (Florida State), DeFuniak Springs, Florida
 Sidhu, Navjeet K. (Wellesley), Winston Salem, North Carolina
 Silver, Jon M. (Duke), Plantation, Florida
 Singh, Jasjit (Radcliffe), Brookville, New York
 Sjaarda, Raymond N. (Michigan), Marshall, Michigan
 Smith, Michael A. (North Carolina at Charlotte), Charlotte, North Carolina
 Sommers, Jefferson M. (North Carolina at Chapel Hill), Fayetteville, North Carolina
 Spach, David H. (Virginia), Durham, North Carolina
 Stacy, George P., Jr. (Purdue), Prospect, Kentucky
 Sugarman, Jeremy (Duke), Paramus, New Jersey
 Sumner, Alice E. (Duke), Concord, North Carolina
 Sutherland, Frederick S. (East Tennessee State), Johnson City, Tennessee
 Sutphin, Loretta G. (Wake Forest), Walnut Cove, North Carolina
 Szabo, Eva (Yale), Merrick, New York
 Taylor, Christina C. (California at Los Angeles), Corvallis, Oregon
 Troutman, James L. (Davidson), Moorestown, New Jersey
 Van Vickle, Jennifer (Chicago), Durham, North Carolina
 Vilase, Vincent J. (Pennsylvania), Dix Hills, New York
 Walsh, James P. (Mississippi), Montgomery, Alabama
 Wang, Henry Z. (Northwestern), Pittsburgh, Pennsylvania
 Welty, Karen E. (Davidson), St. Petersburg, Florida
 Whitney, Winston S. (Bowdoin), Cape Elizabeth, Maine
 Wilkes, David C. (Columbia), Dresher, Pennsylvania
 Williams, Carmen J. (Duke), Poughkeepsie, New York
 Williams, Richard E., Jr. (North Carolina at Chapel Hill), Beulaville, North Carolina
 Wilson, Deborah Y. L. (Drake), Chicago, Illinois
 Wise, Andrew E. (Harvard), New Canaan, Connecticut
 Wyatt, Richard M. (Washington), Calhan, California
 Young, Jacob N. (Florida State), Tallahassee, Florida
 Youngblood, Martha M. (Duke), Springfield, Virginia

Class of 1987

Allf, Bryan Ewing (Duke), Cincinnati, Ohio
 Baratz, Keith H. (Brown), Cheltenham, Pennsylvania
 Belkin, Beth M. (Duke), Jericho, New York

Bird, Lynne M. (Bucknell), Muncy, Pennsylvania
 Blow, Osbert (Columbia), New York, New York
 Bone, Samuel N., III (Duke), Atlanta, Georgia
 Bonner, Marian E. (Wellesley), Hampton, Virginia
 Boyle, Jodell J. (Pomona), Fullerton, California
 Bremner, James D. (Puget Sound), Olympia, Washington
 Broadbent, Kenneth (Utah), Salt Lake City, Utah
 Butterly, David W. (Missouri-Columbia), St. Louis, Missouri
 Cain, John M. (Davidson), Winter Park, Florida
 Carr, David R. (Davidson), Clinton, North Carolina
 Chandler, Mary (California State-Dominguez Hills), Torrance, California
 Cheng, Margaret S. (Harvard), Tustin, California
 Chrysson, Nick G., Jr. (Duke), Winston-Salem, North Carolina
 Cohen, Oren J. (Brandeis), Silver Spring, Maryland
 Constantine, Jeffrey M. (Duke), Jacksonville, Florida
 Cooke, David W. (Massachusetts Inst. of Tech.), Upper Saddle River, New Jersey
 Cooper, Randolph A. (Virginia), Arlington, Virginia
 Coundouriotis, Andrew (Duke), Washington, D.C.
 Cumbee, Sharon R. (Wake Forest), Wake Forest, North Carolina
 Dang-Vu, Anh P. (Bryn Mawr), Alexandria, Virginia
 Darling, Thomas N. (Houghton), Rochester, New York
 Darrow, David (Amherst), Rego Park, New York
 Darwin, Beverly Sumner (Duke), Concord, North Carolina
 Digel, Mary C. (Delaware), Wilmington, Delaware
 Dimick, Richard N. (Duke), Birmingham, Alabama
 Dyke, Cornelius M. (Duke), Redlands, California
 Eaton, Alexander M. (Duke), New York, New York
 Frazier, David W. (Duke), Roanoke Rapids, North Carolina
 Gall, Stanley A., Jr. (Duke), Durham, North Carolina
 Galumbeck, Matthew A. (William and Mary), Virginia Beach, Virginia
 Gartrell, Douglas M. (Oregon State), Lake Oswego, Oregon
 Gelman, Jack J. (Swarthmore), Newton Square, Pennsylvania
 Gingrich, Jay A. (Kansas), Fairway, Kansas
 Gorelick, Marc H. (Princeton), East Northport, New York
 Graff, Jonathan M. (Miami, Ohio), Xenia, Ohio
 Haggard, Aneysa (Rice), Vienna, Virginia
 Harris, Linda D. (Virginia), Springfield, Virginia
 Hartsock, Langdon A. (Davidson), Charlotte, North Carolina
 Hayden, Deborah M. (Dartmouth), Newton, Massachusetts
 Haynes, William L. (Duke), Millers Creek, North Carolina
 Ho, Victor W. (Duke), Pineville, North Carolina
 Inguanzo, Joseph L. (Duke), Chamblee, Georgia
 Karis, John P. (Princeton), Durham, North Carolina
 Kenan, Daniel J. (William and Mary), Durham, North Carolina
 Kim, Paul B. (Columbia), Silver Spring, Maryland
 Kirk, Allan D. (Old Dominion), Virginia Beach, Virginia
 Kohler, Matthew F. (Yale), Kohler, Wisconsin
 Krafchick, Dana (Pennsylvania), Livingston, New Jersey
 Kreager, Julie (Brown), Naples, Florida
 Krystal, Andrew D. (Massachusetts Inst. of Tech.), Birmingham, Michigan
 Lebovitz, Daniel J. (Washington), Durham, North Carolina
 Leclair, Denise M. (Duke), Silver Spring, Maryland
 Lerner, Mark H. (Duke), Salisbury, North Carolina
 Leung, Cyril (California at Berkeley), Jacksonville, North Carolina
 Levine, Ellen (Rutgers), Wayne, New Jersey
 Li, Jennifer S. (Stanford), Indianapolis, Indiana
 Lurie, Scott N. (Duke), Baldwin, New York
 Mandell, Jonathan D. (Brown), Longmeadow, Massachusetts
 Marcus, Stuart (Rutgers), Fair Lawn, New Jersey
 Martin, Pamela H. (Princeton), Rego Park, New York
 Mask, William K. (North Carolina at Chapel Hill), Hamlet, North Carolina
 Meador, Lynne B. (California at Berkeley), Lafayette, California
 Mennillo, Roger (Rhode Island), Warwick, Rhode Island
 Meyers, Steven A. (Duke), Bethesda, Maryland
 Miller, Ann E. (Stanford), Portland, Oregon
 Molter, David W. (Duke), Durham, North Carolina

Montgomery, Robert B., Jr. (Dartmouth), Boise, Idaho
 Morris, Mark L. (Kansas), Topeka, Kansas
 Nanda, Sumit (Rice), Oklahoma City, Oklahoma
 Newcomb, Frederick L., Jr. (Duke), Charlotte, North Carolina
 Paramore, Christopher G. (Duke), Grimesland, North Carolina
 Parent, Leslie J. (Dartmouth), Charleroi, Pennsylvania
 Parlier, Reggie D. (Lenior-Rhyne), Maiden, North Carolina
 Payne, Paul A. (Kansas), Topeka, Kansas
 Persons, Derek A. (Duke), Gaffney, South Carolina
 Philpott, Caroline C. (Duke), Winston-Salem, North Carolina
 Platt, Kenneth P. (Pennsylvania), Allentown, Pennsylvania
 Purut, Cemil M. (North Carolina State), Charlotte, North Carolina
 Rehnke, Robert D. (South Florida), St. Petersburg, Florida
 Rider, Lisa G. (Duke), Basking Ridge, New Jersey
 Rippy, Lee S. (North Carolina at Chapel Hill), Dunn, North Carolina
 Robertson, Susan Markel (Colorado), Broomfield, Colorado
 Russell, William A., III (George Washington), Kensington, Maryland
 Safran, Marc (California at Berkeley), Los Angeles, California
 Schoeffel, Annette C. (Duke), Woodcliff Lake, New Jersey
 Schumacher, Donald J. (Massachusetts Inst. of Tech.), Colts Neck, New Jersey
 Schwarz, James K. (Vanderbilt), Creve Coeur, Missouri
 Scialabba, Fred A. (Princeton), Plainfield, New Jersey
 Sell, Timothy L. (Harvard), Mocksville, North Carolina
 Shull, William H., Jr. (Dartmouth), Charlotte, North Carolina
 Silverstein, Leonard (Duke), Brooklyn, New York
 Slaughter, Thomas F. (Wake Forest), Kannapolis, North Carolina
 Spaulding, Cora D. (Stanford), Chicago, Illinois
 Stanton, Brock A. (Georgia Inst. of Tech.), Chamblee, Georgia
 Stenzel, Timothy T. (Grinnell), New Hope, Minnesota
 Strohl, Durga (Pennsylvania), Piscataway, New Jersey
 Swaim, Mark W. (North Carolina at Greensboro), Kernersville, North Carolina
 Taylor-Albert, Elizabeth S. (Duke), Carmel, Indiana
 Tucker, Susan L. (Duke), Greenville, North Carolina
 Tweed, J. Lindsey (Dartmouth), San Francisco, California
 Uraizee, Ashfaq (Duke), Charlotte, North Carolina
 Vick, William W. (North Carolina at Chapel Hill), Chapel Hill, North Carolina
 Walker, Ann G. (Duke), New Brunswick, New Jersey
 Walsh, Kim M. (Dartmouth), Monona, Wisconsin
 Warner, Deryl H. (Duke), Charlotte, North Carolina
 Wei, Maria L. (Michigan), Ann Arbor, Michigan
 Weingart, Jon D. (Duke), Akron, Ohio
 Weischedel, Garry (St. Lawrence), Camillus, New York
 Weiss, Eric (Davidson), St. Petersburg, Florida
 White, Elmer R., III (North Carolina at Chapel Hill), Boone, North Carolina
 Whyte, Lynne Meador (California at Berkeley), Lafayette, California
 Wilson, Douglas A. (Wheaton), Elm Grove, Wisconsin
 Yohay, Daniel (Union), New Hyde Park, New York
 Yoshino, Paul (Occidental), San Pedro, California

Class of 1988

Ahearne, Paul M. (Duke), McLean, Virginia
 Anderson, Ian C. (Stanford), Stanford, California
 Anderson, William D. (Duke), Durham, North Carolina
 Bates, Michael D. (Duke), Rochester, Michigan
 Behar, Marcy L. (Duke), Durham, North Carolina
 Bolster, David E. (North Carolina at Chapel Hill), Durham, North Carolina
 Bronstein, Seymour M. (Duke), Durham, North Carolina
 Brown, Thomas M. (Kentucky), Lexington, Kentucky
 Bryant, Randall M. (Princeton), Newport, North Carolina
 Bryce, Sarah S. (Yale), Philadelphia, Pennsylvania
 Budnick, Sydna G. (Brown), Clifton, New Jersey
 Bumgarner, John R. (Memphis State), Dallas, Texas
 Burk, Robert W., III (Virginia), Parkersburg, West Virginia
 Calle, Angela M. (Loyola), Phoenix, Maryland
 Calton, William C., Jr. (Davidson), Charlotte, North Carolina

Chen, Serena H. (Brown), Bryn Mawr, Pennsylvania
 Chow, Gregory H. (Johns Hopkins), Bridgewater, New Jersey
 Cook, Perry F. (Stanford and Duke), Raleigh, North Carolina
 Cox, Patricia M. (Fordham), Point Lookout, New York
 Cross, Pamela (Middlebury), Charlottesville, Virginia
 Crovitz, Deborah H. (Chicago), Durham, North Carolina
 Crownover, Brenda P. (Linfield), Bellevue, Washington
 Cullen, Joseph P. (Cornell), West Hartford, Connecticut
 Culton, Mark A. (Duke), Charlotte, North Carolina
 Dontfraid, Franklyn (Connecticut State), New Haven, Connecticut
 Edmond, Roderick E. (Morehouse), Atlanta, Georgia
 Evans, Avery J. (Virginia) Virginia Beach, Virginia
 Fang, Jim C. T. (Duke), Tuscaloosa, Alabama
 Foster, Jill A. (Oberlin), Silver Spring, Maryland
 Frantz, Frazier W. (U.S. Naval Academy), Sicklerville, New Jersey
 Freeman, Bradley D. (Florida), Longwood, Florida
 Gemperli, Pia M. (Cornell), Pleasant Valley, New York
 Gephart, Christina M. (Virginia), Arlington, Virginia
 Go, Loewe O. (Duke), Quezon City, Philippines
 Goldberg, Marc A. (Duke), Brooklyn, New York
 Grossnickle, Mark E. (Duke), Greenville, North Carolina
 Haim, Kevin (Duke), Silver Spring, Maryland
 Hale, Laura P. (Michigan State), Durham, North Carolina
 Hall, Bruce L. (Princeton), Warminster, Pennsylvania
 Henderson, Shetoro (West Chester), Philadelphia, Pennsylvania
 Henry, Marguerite L. (Duke), St. Louis, Missouri
 Hoehner, Jeff C. (Idaho), Pocatello, Idaho
 Hoffman, Kristina M. (Loyola Marymount), Clearwater, Florida
 Hollett, Michael D. (Duke), Arlington Heights, Illinois
 Holmes, Jude, Jr. (North Carolina at Chapel Hill), Maple Hill, North Carolina
 Holway, Brent P. (Vanderbilt), Charlotte, North Carolina
 Hoock, Jennifer L. (Oberlin), Gary, Indiana
 Huang, Mary S. (Harvard/Radcliffe), Houghton, Michigan
 Hulka, Gregory E. (Northwestern), Chapel Hill, North Carolina
 Humayun, Mark S. (Georgetown), Potomac, Maryland
 Ibrahim, George K. (Davidson), Smithfield, North Carolina
 Jeffries, Jennifer J. (Virginia), Washington, D.C.
 Kaufman, Jeffrey (New York at Stony Brook), Plainview, New York
 King, Robert T., III (Duke), Hickory, North Carolina
 Kinsel, Laura B. (Washington), Richland, Washington
 Kinsman, James M. III (North Carolina at Chapel Hill), Louisville, Kentucky
 Koriwchak, Michael J. (Bucknell), McMurray, Pennsylvania
 Landay, Kimberly (Brown), Pittsburgh, Pennsylvania
 Lee, Joon S. (Dartmouth), Morganton, North Carolina
 LeMosy, Ellen K. (Florida), Orlando, Florida
 Lontkowski, Susan M. (Duke), Lafayette Hill, Pennsylvania
 Lyerly, Mark A. (North Carolina at Chapel Hill), Rockwell, North Carolina
 Lyerly, Walker, IV (Davidson), Hickory, North Carolina
 Maddox, Ricky P. (Erskine), Donalds, South Carolina
 Maki, Jeffrey H. (California at San Diego), Davis, California
 Mao, Lisa K. (Rice), Scottsdale, Arizona
 Markowitz, Jay S. (Columbia), Woodmere, New York
 Marrano, Neal N. (Brown), APO New York, New York
 Mask, William K. (North Carolina at Chapel Hill), Hamlet, North Carolina
 Maynor, Bobby R., Jr. (North Carolina at Chapel Hill), Pembroke, North Carolina
 McIntosh, Mark S. (Duke), Sanford, Florida
 McLoughlin, Thomas (Johns Hopkins), Tinton Falls, New Jersey
 McQuigg, Molly (Wooster), Delaware, Ohio
 Muly, Emil C. III (Johns Hopkins), Southport, Connecticut
 Murchison, Susan C. (Duke), Wilmington, North Carolina
 Obremskey, William (Duke), Lebanon, Indiana
 Ozaki, Charles K. (Duke), Lake City, Florida
 Panza, William S. (Johns Hopkins), Emerson, New Jersey
 Paul, Randal H. (Baylor) Lake Jackson, Texas
 Podolak, Michael J. (Duke), Kensington, Maryland
 Pollard, John B. (California at Berkeley), Carmel, California

Poteat, Harry T. (Pomona), Paoli, Pennsylvania
 Powell, Allen O. (Massachusetts Instit. of Tech.), Wethersfield, Connecticut
 Pressman, Eva K. (Brown), Bayside, New York
 Pyne, John I. B., Jr. (Dartmouth), Princeton, New Jersey
 Rossitch, John C. (North Carolina at Chapel Hill), Winston-Salem, North Carolina
 Sater, Richard A. (Florida), Cocoa Beach, Florida
 Scarlett, Susan M. (Clemson), Hilton Head Island, South Carolina
 Schroering, Edward S., Jr. (Duke), Louisville, Kentucky
 Segreti, Eileen M. (Pennsylvania), Bethesda, Maryland
 Simeone, Diane M. (Brown), North Kingstown, Rhode Island
 Simmons, Rache M. (Duke), Matthews, North Carolina
 Skapek, Stephen X. (Duke), Shaker Heights, Ohio
 Smith, Bryan W. (North Carolina at Chapel Hill), New Bern, North Carolina
 Stasheff, Steven F. (North Carolina at Chapel Hill), Raleigh, North Carolina
 Sternbergh, W. Charles, III (Brown), Chattanooga, Tennessee
 Stinson, Michael S. (North Carolina at Greensboro), Greensboro, North Carolina
 Stone, Lisa M. (Pomona), Phoenix, Arizona
 Straznickas, John R. (Illinois), Rockford, Illinois
 Sukin, Craig A. (Dartmouth), Billings, Montana
 Swearengin, Dennis R. (Davidson), Statesville, North Carolina
 Talbott, Gregory A. (North Carolina at Chapel Hill), Concord, North Carolina
 Tedder, Mark (North Carolina State), Greensboro, North Carolina
 Terris, David (Cornell), Upper Saddle River, New Jersey
 Tope, Whitney D. (Duke), Decatur, Georgia
 Truett, Artis P., III (Georgia Inst. of Tech.), Vidalia, Georgia
 Tyrey, Scott J. (Duke), Durham, North Carolina
 Vance, Charles R. (Princeton), Birmingham, Alabama
 Van Hoesen, Karen B. (California at Davis), Orinda, California
 Wang, Clark J. (Duke), Ann Arbor, Michigan
 Wechsler, Mia (Williams), Weston, Massachusetts
 Weck, Karen E. (Duke), Great Falls, Virginia
 Wilson, Brett L. (Duke), Conway, South Carolina
 Wolff, Steven D. (Yale), Quincy, Massachusetts
 Yang, Syngil (Yale), Chappaqua, New York
 Zeidman, Seth M. (Duke), Cherry Hill, New Jersey



Class of 1984 with Postgraduate Year One Appointments

- Adams, Renee Elaine (Hiddenite, North Carolina) University of California, San Diego Affiliated Hospitals, San Diego, California—Internal Medicine
- Albert, David Ernest (McAlester, Oklahoma)—No PGY-1
- Allen, Susan Ann (Tampa, Florida) University of California at San Francisco, San Francisco, California—Pathology
- Amoroso, Kathy (Vienna, Virginia) University of Texas Southwestern Medical Center, Parkland Memorial Hospital, Dallas, Texas—Pediatrics
- Anderson, Russell (Huizen, The Netherlands) Case Western University Hospitals, Cleveland, Ohio—Internal Medicine
- Anthony, Douglas Carter (Kansas City, Missouri) Duke University Medical Center, Durham, North Carolina—Pathology
- Artis, Avis Adriana (Faison, North Carolina) West Virginia University Medical Center, Charleston, West Virginia—Obstetrics and Gynecology
- Baker, Jeffrey P. (Atlanta, Georgia) University of Colorado, Denver, Colorado—Pediatrics
- Barrett, Lynn (Birmingham, Michigan) Mallinckrodt Institute of Radiology, St. Louis, Missouri—Radiology
- Benyunes, Mark Christopher (Morehead City, North Carolina) Johns Hopkins Hospital, Baltimore, Maryland—Internal Medicine
- Bonner, Jocelyn Wolfe (Hampton, Virginia) University Health Center of Pittsburgh, Pittsburgh, Pennsylvania—Psychiatry
- Brorein, William Jacob, Jr. (Whippany, New Jersey) Strong Memorial Hospital, Rochester, New York—Internal Medicine
- Buncke, Geoffrey Harry (Hillsborough, California) University of California (Affiliated), Davis, California—General Surgery
- Carr, William Curtis (Clinton, North Carolina) St. Louis Children's Hospital, St. Louis, Missouri—Pediatrics
- Chang, Jonathan L. (Okemos, Michigan) University of Virginia, Charlottesville, Virginia—Orthopaedic Surgery
- Coin, James Thaddeus (Fayetteville, North Carolina) Duke University Medical Center, Durham, North Carolina—Internal Medicine
- Cover, Timothy Lee (Myerstown, Pennsylvania) Hershey Medical Center, Hershey, Pennsylvania—Internal Medicine
- Crutcher, Kenneth Lloyd (Atlanta, Georgia) Duke-Watts Family Medicine Center, Durham, North Carolina—Family Medicine
- Csorba, Amy Ruth (Annapolis, Maryland) Duke University Medical Center, Durham, North Carolina—Family Medicine
- Dietz, John W., Jr. (Opportunity, Washington) Madigan Army Medical Center, Tacoma, Washington—Orthopaedic Surgery
- Dunnmon, Preston Mark (Durham, North Carolina) University of Texas Southwestern Medical Center, Parkland Memorial Hospital, Dallas, Texas—Internal Medicine
- Ellison, David Michael (Charleston, South Carolina) Johns Hopkins Hospital, Baltimore, Maryland—Internal Medicine
- Erickson, Lars Carl (Durham, North Carolina) University of California at San Francisco, San Francisco, California—Pediatrics
- Feldman, David L. (Woodmere, New York) Roosevelt Hospital, New York, New York—General Surgery
- Galloway, Marc Tomas (Concord, North Carolina) Yale-New Haven Medical Center, New Haven, Connecticut—General Surgery
- George, Gregory Spiro (New Windsor, New York) St. Johns Mercy Medical Center, St. Louis, Missouri—Internal Medicine
- Germino, F. Joseph (Palos Park, Illinois) Yale-New Haven Medical Center, New Haven, Connecticut—Internal Medicine
- Gonias, Steven L. (New York, New York) Duke University Medical Center, Durham, North Carolina—Pathology
- Griffeth, Landis K. (Greenville, South Carolina) The Mallinckrodt Institute of Radiology, St. Louis, Missouri—Radiology
- Grossman, Rachel Mindel (Teaneck, New Jersey) Thomas Jefferson University, Philadelphia, Pennsylvania—Internal Medicine
- Hall, David Hartman (Potomac, Maryland) Medical Center Hospitals of South Carolina, Charleston, South Carolina—Family Medicine
- Hall, Samuel Elijah (Silver Spring, Maryland) University of Texas Southwestern Affiliated Hospitals, Dallas, Texas—Obstetrics and Gynecology
- Harris, Sally Stewart (Atherton, California) North Carolina Memorial Hospital, Chapel Hill, North Carolina—Pediatrics

- Harris, Steven Gilbert (Daytona Beach, Florida) University of Texas Southwestern Medical Center, Parkland Memorial Hospital, Dallas, Texas—General Surgery
- Hatcher, Paul Arthur (Hudson, Ohio) Massachusetts General Hospital, Boston Massachusetts—General Surgery
- Havlic, Diane Virginia (Park Ridge, Illinois) University of California at San Francisco, San Francisco, California—Internal Medicine
- Hillery, Cheryl Ann (Lancaster, Wisconsin) North Carolina Memorial Hospital, Chapel Hill, North Carolina—Transitional
- Howell, David Noble (Greenville, North Carolina) Duke University Medical Center, Durham, North Carolina—Pathology
- Hull, Jeffrey Eaton (Greenwich, Connecticut) National Navy Medical Center, Bethesda, Maryland—Radiology
- Iruela, Maria Eugenia (Winston-Salem, North Carolina) Bowman Gray School of Medicine, Winston-Salem, North Carolina—Family Medicine
- Jackson, Andrea Marie (Washington, D.C.) George Washington University Hospitals, Washington, D.C.—Obstetrics and Gynecology
- Jackson, Fiona Susan (Princeton, New Jersey) University of North Carolina at Chapel Hill, Chapel Hill, North Carolina—Internal Medicine
- Jackson, Jean Leigh (Weston, Massachusetts) Rhode Island Hospital, Providence, Rhode Island—Pediatrics
- James, Walter Scott, III (Atlanta, Georgia) Louisiana State University, New Orleans, Louisiana—Orthopaedic Surgery
- Jester, Joy Darlene (Asheboro, North Carolina) University of Alabama Medical Center, Birmingham, Alabama—Internal Medicine
- Jetmore, Allen Bruce (Parkville, Missouri) The New York Hospital, Cornell University, New York, New York—General Surgery
- Johnston, James Martin (Greensboro, North Carolina) University of Utah Affiliated Hospitals, Salt Lake City, Utah—Pediatrics
- Jones, Janet McCauley (Burlington, North Carolina) Eastern Virginia Graduate School of Medicine, Norfolk, Virginia—Obstetrics and Gynecology
- Joslyn, Ann Kathryn (Roanoke, Virginia) Virginia Mason Hospital, Seattle, Washington—Internal Medicine
- Knox, James Bice (Wilmington, Delaware) Brigham and Women's Hospital, Boston, Massachusetts—General Surgery
- Kokenes, Constantine (Charlotte, North Carolina) Emory University, Atlanta, Georgia—Anesthesiology
- Kubek, Bonnie Lee (Cleveland Heights, Ohio) Mount Zion Hospital, San Francisco, California—Pediatrics
- Kupke, Kenneth George (Hickory, North Carolina) Children's Hospital, Boston, Massachusetts—Pediatrics
- Lazarus, Kenneth Jay (Miami, Florida) University of Virginia, Charlottesville, Virginia—Internal Medicine
- Ling, Mark Russell (Merion, Pennsylvania) Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania—Internal Medicine
- Litaker, David G. (Charlotte, North Carolina) National Naval Medical Center, Bethesda, Maryland—Internal Medicine
- Livingston, Elizabeth Gresham (Birmingham, Alabama) University of California at San Francisco, San Francisco, California—Obstetrics and Gynecology
- Locklear, J. C. (Pembroke, North Carolina) Charlotte Memorial Hospital, Charlotte, North Carolina—Internal Medicine
- Lucas, Marsha A. (Malvern, Pennsylvania) Duke University Medical Center, Durham, North Carolina—Pathology
- Mallon, William James (Framingham, Massachusetts) Duke University Medical Center, Durham, North Carolina—Orthopaedic Surgery
- Massad, Leslie Stewart, Jr. (Manlius, New York) Albany Medical Center Hospital, Albany, New York—Internal Medicine
- Matson, Linda Kay (Schenectady, New York) University of Wisconsin, Madison, Wisconsin—Pediatrics
- Mawhorter, Steven Dwight (Cincinnati, Ohio) University of Rochester, Rochester, New York—Internal Medicine/Pediatrics
- McCall, William Vaughn (Winston-Salem, North Carolina) Duke University Medical Center, Durham, North Carolina—Psychiatry
- McCann, Una Dierdre (Portland, Maine) Stanford University, Stanford, California—Psychiatry
- McDonald, William Maffitt (St. Louis, Missouri) Duke University Medical Center, Durham, North Carolina—Psychiatry
- McNamara, Michael James (Philadelphia, Pennsylvania) Duke University Medical Center, Durham, North Carolina—Orthopaedic Surgery

McNeill, Robert Eric (West Jefferson, North Carolina) Medical College of Virginia, Richmond, Virginia—Internal Medicine

Michel, Thomas Mark (Portland, Oregon) Brigham and Women's Hospital, Boston, Massachusetts—Internal Medicine

Moore, Karen Anne (Durham, North Carolina) Emory University, Atlanta, Georgia—Pediatrics

Moreadith, Randall Wade (Leland, North Carolina) Duke University Medical Center, Durham, North Carolina—Internal Medicine

Nevett, Robert E. (Hudson, Ohio) Washington University, Barnes Hospital, St. Louis, Missouri—Anesthesiology

Newton, Joseph Royal, Jr. (Wilson, North Carolina) Massachusetts General Hospital, Boston, Massachusetts—General Surgery

Ney, Kathryn Ann (Pittsburgh, Pennsylvania) North Carolina Memorial Hospital, Chapel Hill, North Carolina—Pathology

Page, Richard Leighton (Chapel Hill, North Carolina) Massachusetts General Hospital, Boston, Massachusetts—Internal Medicine

Pegues, Robert Fielding (Columbus, Ohio) Hospitals of the University of Pennsylvania, Philadelphia, Pennsylvania—General Surgery

Penny, Wade Hampton, III (Durham, North Carolina) University of South Florida Affiliated Hospitals, Tampa, Florida—Orthopaedic Surgery

Pike, Marilyn C. (New Rochelle, New York) Massachusetts General Hospital, Boston, Massachusetts—Internal Medicine

Piwnica-Worms, David Rolland (Excelsior, Minnesota) Peter Bent Brigham Hospital, Harvard Medical Center, Boston, Massachusetts—Radiology

Porter, Kevin Randall (Atlanta, Georgia) National Naval Medical Center, Bethesda, Maryland—Internal Medicine

Quansah, Felicity Araba Fobah (Apam, Ghana) Emory University, Atlanta, Georgia—Ophthalmology

Rabkin, Michael Scott (Holyoke, Massachusetts) University of Utah, Salt Lake City, Utah—Pathology

Rajan, Narain Prasad (Gaithersburg, Maryland) Baylor College Affiliated Hospitals, Houston, Texas—Internal Medicine

Rice, Paula Kimball Whitehouse (Raleigh, North Carolina) University of North Carolina at Chapel Hill, Chapel Hill, North Carolina—Radiology

Rich, John Armand (Bayside, New York) Massachusetts General Hospital, Boston, Massachusetts—Internal Medicine

Roberts, Kenneth Berwick (Westport, Connecticut) Ohio State University, Columbus, Ohio—Internal Medicine

Ross, Glen (Rockville Centre, New York) National Naval Medical Center, Bethesda, Maryland—General Surgery

Rustgi, Anil Kumar (Williamsville, New York) Beth Israel Hospital, Boston, Massachusetts—Internal Medicine

Saltzman, Andrew Todd (Bloomington, Indiana) University of Vermont, Burlington, Vermont—General Surgery

Schanberg, Laura Eve (Durham, North Carolina) Duke University Medical Center, Durham, North Carolina—Pediatrics

Schneider, Michael G. (Edinboro, Pennsylvania) Emory University, Grady Hospital, Atlanta, Georgia—Anesthesiology

Scroggs, Mark Wade (Durham, North Carolina) Duke University Medical Center, Durham, North Carolina—Pathology

Seabolt, Sarah Jane (Greensboro, North Carolina) University of Hawaii, Honolulu, Hawaii—Internal Medicine

Selin, Karen L. (Deer Isle, Maine) Dartmouth-Hitchcock Medical Center, Hanover, New Hampshire—Internal Medicine

Shearin, William Arthur, Jr. (Cary, North Carolina) University of Hawaii, Honolulu, Hawaii—Transitional

Shore, Neal David (Matawan, New Jersey) The New York Hospital, Cornell Medical Center, New York, New York—Urology

Short, Timothy Burns (Durham, North Carolina) University of Virginia, Charlottesville, Virginia—Family Medicine

Silberman, Michael Keith (Durham, North Carolina) Duke University Medical Center, Durham, North Carolina—Internal Medicine

Small, James M. (Denver, Colorado) University of Utah, Salt Lake City, Utah—Pathology

Smith, Lyman S-W (Klamath Falls, Oregon) University of Virginia, Charlottesville, Virginia—Orthopaedic Surgery

Spector, Rona (New York, New York) Hahnemann University Hospital, Philadelphia, Pennsylvania—Psychiatry

Sperduto, Paul Wayne (Olathe, Kansas) Luce Scholar, Asia—Oncology/Public Policy

Stambler, Bruce Sheldon (Woodmere, New York) Beth Israel Hospital, Boston, Massachusetts—Internal Medicine

Stephens, Paul, Jr. (Newark, New Jersey) Medical College of Georgia, Augusta, Georgia—Family Medicine

Stoneburner, Sara Ellen (Danville, Virginia) Duke University Medical Center, Durham, North Carolina—Internal Medicine

Strader, David J. (Alexandria, Virginia) Presbyterian Hospital, New York, New York—Pediatrics

Swain, Mary Early (Sarasota, Florida) Washington Hospital Center, Washington, D.C.—Internal Medicine

Tanaka, Taro (Minneapolis, Minnesota) University of Colorado at Denver, Denver, Colorado—Pediatrics

Tatum, Emily Jane (Toccoa, Georgia) Medical University of South Carolina, Charleston, South Carolina—Family Medicine

Tobin, Jayne Ellen (Dyersville, Iowa) Framingham Union Hospital, Boston, Massachusetts—Transitional

Vance, Jeffery Marvin (Rancho Palos Verdes, California) Duke University Medical Center, Durham, North Carolina—Internal Medicine

Vandeven, Andrea Marie (North Syracuse, New York) Children's Hospital, Boston, Massachusetts—Pediatrics

Velaj, Richard Hulussi (Greenwich, Connecticut) Massachusetts General Hospital, Boston, Massachusetts—Radiology

Vickrey, Barbara Grace (Murfreesboro, Tennessee) University of Washington Affiliated Hospitals, Seattle, Washington—Neurology

Volpp, Bryan Donovan (Fresno, California) University of Iowa, Iowa City, Iowa—Internal Medicine

Vu, Michael Thien (Rego Park, New York) St. Mary's Medical Center, Long Beach, California—Internal Medicine

Walker, Cheryl Lynn (Westfield, New Jersey) Northwestern University, McGaw Medical Center, Chicago, Illinois—Internal Medicine

Westry, Jeannie Anne (Rockville, Maryland) Yale-New Haven Medical Center, New Haven, Connecticut—Pediatrics

Wiley, Catherine Clinton (Glastonbury, Connecticut) The Children's Hospital of Philadelphia, Philadelphia, Pennsylvania—Pediatrics

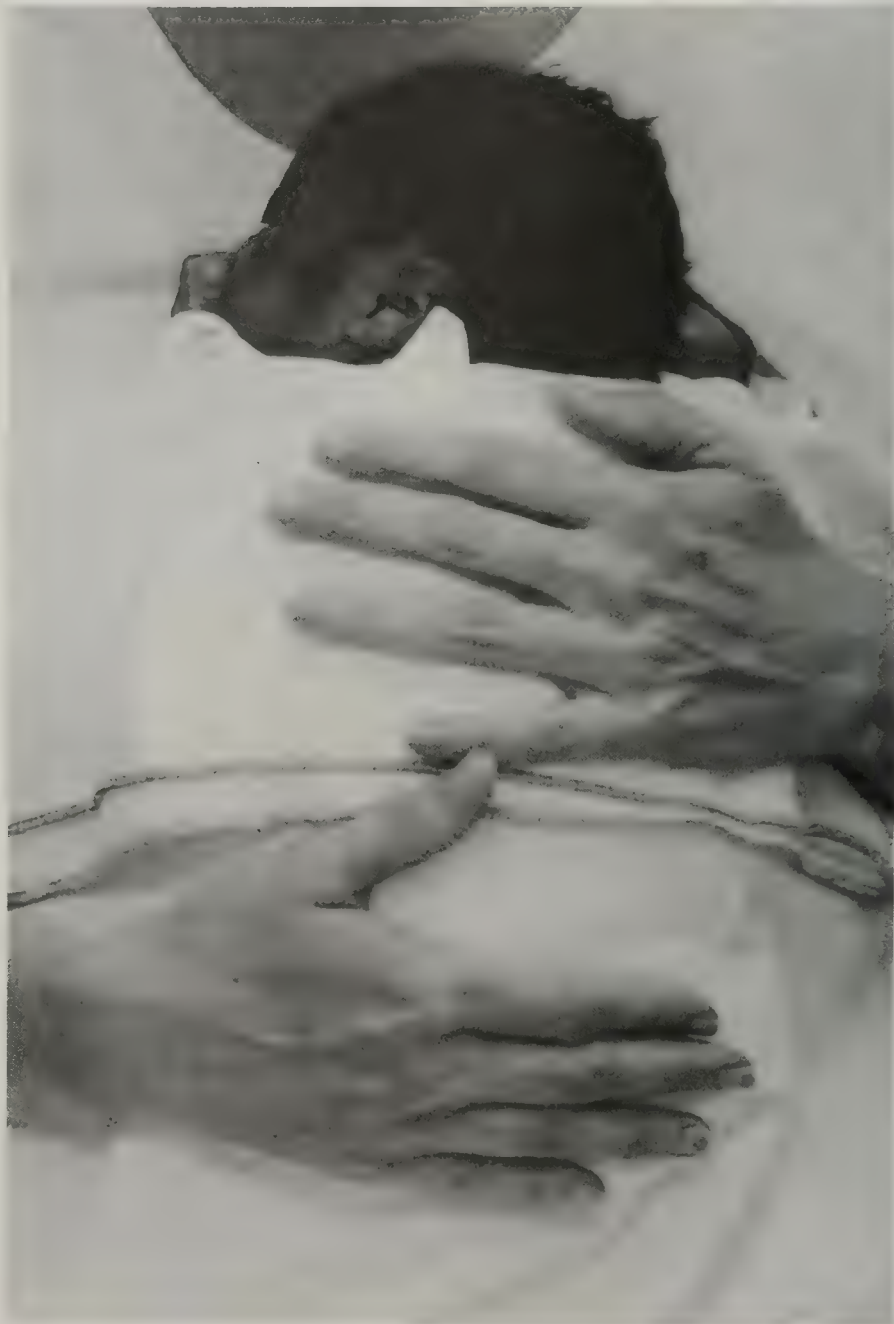
Wolfe, James Alen (Charlotte, North Carolina) Brigham and Women's Hospital, Boston, Massachusetts—General Surgery

Wood, Lauren Virginia (Silver Spring, Maryland) Baylor College of Medicine, Houston, Texas—Pediatrics/Medicine

Wright, Martha Susan (Syosset, New York) Children's Hospital National Medical Center, Washington, D.C.—Pediatrics

School of Nursing

School of Nursing



The Master of Science in Nursing Program

The School of Nursing offers a program leading to the Master of Science in Nursing degree, which educates professional nurses for advanced practice in a clinical specialty or administration. Graduates will be prepared to function as clinical specialists in tertiary care settings or as mid-level administrators in complex organizations and to use high technology support systems for information and patient services.

The integration of education, practice, and research undergirds the entire curriculum and the behavior of those individuals involved in the educative process.

A graduate of the program will be expected to:

1. synthesize concepts and theories from nursing and related disciplines to form the basis for advanced practice;
2. demonstrate expertise in a defined area of advanced practice;
3. conduct scientific inquiry to validate and refine knowledge relevant to nursing;
4. demonstrate leadership and management strategies for advanced practice;
5. demonstrate proficiency in the use and management of advanced technology related to patient care and support systems,
6. analyze socio-cultural, ethical, economic, and political issues and develop strategies to influence the outcomes, and demonstrate the ability to engage in collegial intra- and interdisciplinary relationships in the conduct of advanced practice.

The curriculum is designed to provide maximum flexibility for part-time study during both day and evening hours. Students will have advisers who have expertise and research interests in the student's chosen area of specialization. A student may choose one of the three areas in which to specialize: (1) critical care—adult or child; (2) oncology—adult or child; and (3) administration of nursing services. An emphasis on scholarship and practice will be maintained throughout the curriculum.

General Curriculum Design	Credits
Theoretic and Scientific Bases for Advanced Practice	3
Organizational Behavior and Processes	3
Health Care Technology	3
Processes of Inquiry	6
Area of Specialization, Content and Practice	12-15
Elective	3-6
Thesis	6
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Admission Requirements

1. Bachelor's degree with an upper division nursing major from a program accredited by the National League for Nursing.
2. Minimum of one year's experience in an area relevant to projected course of study in a clinical specialty and three years for administration.
3. Undergraduate grade point average of 3.0 on a 4.0 scale.
4. Satisfactory performance on the Graduate Record Examination.
5. Satisfactory completion of a course in descriptive and inferential statistics.
6. Eligibility to be licensed as a professional nurse in North Carolina.
7. Documentation of the acquisition of physical assessment knowledge and skills for those applicants choosing a clinical specialty.
8. Three references attesting to personal and professional qualifications. At least two references must be from former employers, faculty members, or deans.
9. Personal interview. Other arrangements may be considered when distance is a factor.

Selection will be based on the applicant's qualifications, intellectual curiosity, and potential for professional growth and contribution to the profession. Exception to any of these requirements will be considered on an individual basis. Students are chosen without regard to race, religion, sex, or national origin.

Date for Application

An application with all supporting documents must be submitted by March 1 for fall semester admission.

Courses

NURS-300. Theoretic and Scientific Bases for Advanced Nursing Practice. The major components of this core course—nursing, health, persons, and society—are approached as the bases for advanced nursing practice in a complex health care center. The focus is the analysis of relevant principles, theories, and issues for the synthesis of a framework for advanced nursing practice. 3 credits.

NURS-303. Organizational Behavior and Processes. This course will examine the key concepts and elements which form the basis for understanding and analyzing the similarities and differences of groups and complex organizations. Selected theories of group and organizational dynamics, structure, process, and behaviors will be presented. 3 credits.

NURS-306. Health Care Technology. This course is designed to provide an eclectic study of technological modalities presently used to assist in the diagnosis and

treatment of patients, planning and monitoring of care, management of information, and communicating among care providers. The student will be provided opportunities for the development of knowledge, intellectual skills and clinical competence. The philosophy and ethical dilemmas inherent in the use of sophisticated equipment are examined. 3 credits.

NURS-309. Processes of Inquiry I. The focus of this course is on scientific inquiry and research methods needed for systematic investigation to expand the knowledge base relevant to nursing. Published research studies concerning health care will be critically analyzed. 3 credits.

NURS-310. Processes of Inquiry II. The emphasis of this course is on the relationships among research design, methodology, and statistical techniques. Application and interpretation of statistical procedures will be studied in relation to the most common research designs used in health care and nursing. 3 credits.

NURS-320. Critical Care Nursing I. This course presents a perspective on selected developmental, family, and epidemiologic theories (Module 1) and covers in depth cardiovascular problems, treatment, and technology (Module 2) as a basis for advanced nursing practice. Both modules include didactic and clinical experience. 4 credits.

NURS-322. Critical Care Nursing II. This course focuses on the complex problems, treatment and technology of the renal, urologic, and gynecologic systems (Module 1) and on the respiratory, neuroendocrine, and gastrointestinal systems (Module 2) as a basis for advanced nursing practice. Both modules include didactic and clinical practice. 4 credits.

NURS-324. Critical Care Nursing III. This course focuses on the complex problems, treatment, and technology of traumatic injury, including burns and musculoskeletal insults (Modules 1) and on role, planning, and trends in critical care (Module 2) as a basis for advanced nursing practice. Both modules include didactic and clinical experience. 4 credits.

NURS-330. Oncology Nursing I. This course provides an in-depth understanding of the pathophysiological and biobehavioral aspects of cancer across the life span. Major topics include: (1) advances in treatment (2) management of disease and treatment and (3) biopsychosocial assessment of patients. Both didactic and clinical experiences are included in the course. 4 credits.

NURS-332. Oncology Nursing II. *Module 1, Economics of Cancer.* This module includes: (1) the functions of a comprehensive cancer center, (2) the economic issues involved in the problems of cancer, (3) demographic trends such as increased longevity with increased incidence of cancer and life style patterns, (4) cancer as a chronic illness across the life span and the potential long term sequelae of treatment and (5) policy issues related to appropriation of funds for cancer research and practice. 4 credits.

Module 2, Rehabilitation of the Patient with Cancer. This module includes: (1) the use of strategic therapy and coping skills as the patient accepts and participates in active cancer treatments, (2) biobehavioral theories of stress and disease, (3) nursing interventions to improve patient functional status, and (4) therapeutic communication and (5) the application of behavioral interventions. Both didactic and clinical experiences are included in the course.

NURS-334. Oncology Nursing III. This course focuses on: (1) the role of the clinical specialist caring for patients participating in clinical trials using technological advances in the treatment of cancer; (2) major problems resulting from cancer and its related treatment; (3) the importance of inter- intra-agency collaboration at the local,

state, and national level; (4) theories of therapeutic alliance and codecision making that increase patient participation; and (5) the development of effective coping strategies needed in caring for patients with cancer. Both didactic and clinical experiences are included in the course. 4 credits.

NURS-340. Nursing Management in Complex Organizations I. This course focuses on those structural elements, issues, and situations that are the responsibility of the mid-level nurse manager in a complex organization. Management and organizational theories are used to develop strategies for dealing with stress imposed by internal and external forces in the environment. 3 credits.

NURS-342. Nursing Management Practicum I. The student observes and applies those concepts and theories that support the integrative functions and responsibilities of a mid-level nurse manager in a complex organization. Placement in service agencies is arranged to be congruent with the student's career plans. Prerequisite: NURS-340 or concurrent. 3 credits.

NURS-344. Nursing Management in Complex Organizations II. This course focuses on the examination of processes that facilitate the achievement of a high level of quality patient care, employee productivity, and employee development in a complex environment. Leadership theories and concepts are used to analyze the adaptive mechanisms needed by the mid-level nurse manager in a dynamic and technologic environment. 3 credits.

NURS-346. Nursing Management Practicum II. This practicum experience provides the student with the opportunity to apply knowledge and skills in the management of select processes within a dynamic and technologic environment. Identification of strategies, intervention, and evaluation of various approaches to nursing management are investigated. Placement in service agencies is arranged to be congruent with the students' career plans. Prerequisite: NURS-344 or concurrent. 3 credits.

NURS-348. Budget Planning and Financial Management. This course focuses on the knowledge and skills required by the mid-level nurse manager for budget planning and fiscal management of a defined unit or department. Health care economics, technology, standards of practice, staffing, and patient classification are examined from a budgetary perspective and within an environment of regulations and constraints. 3 credits.

NURS-350. Thesis. 6 credits.

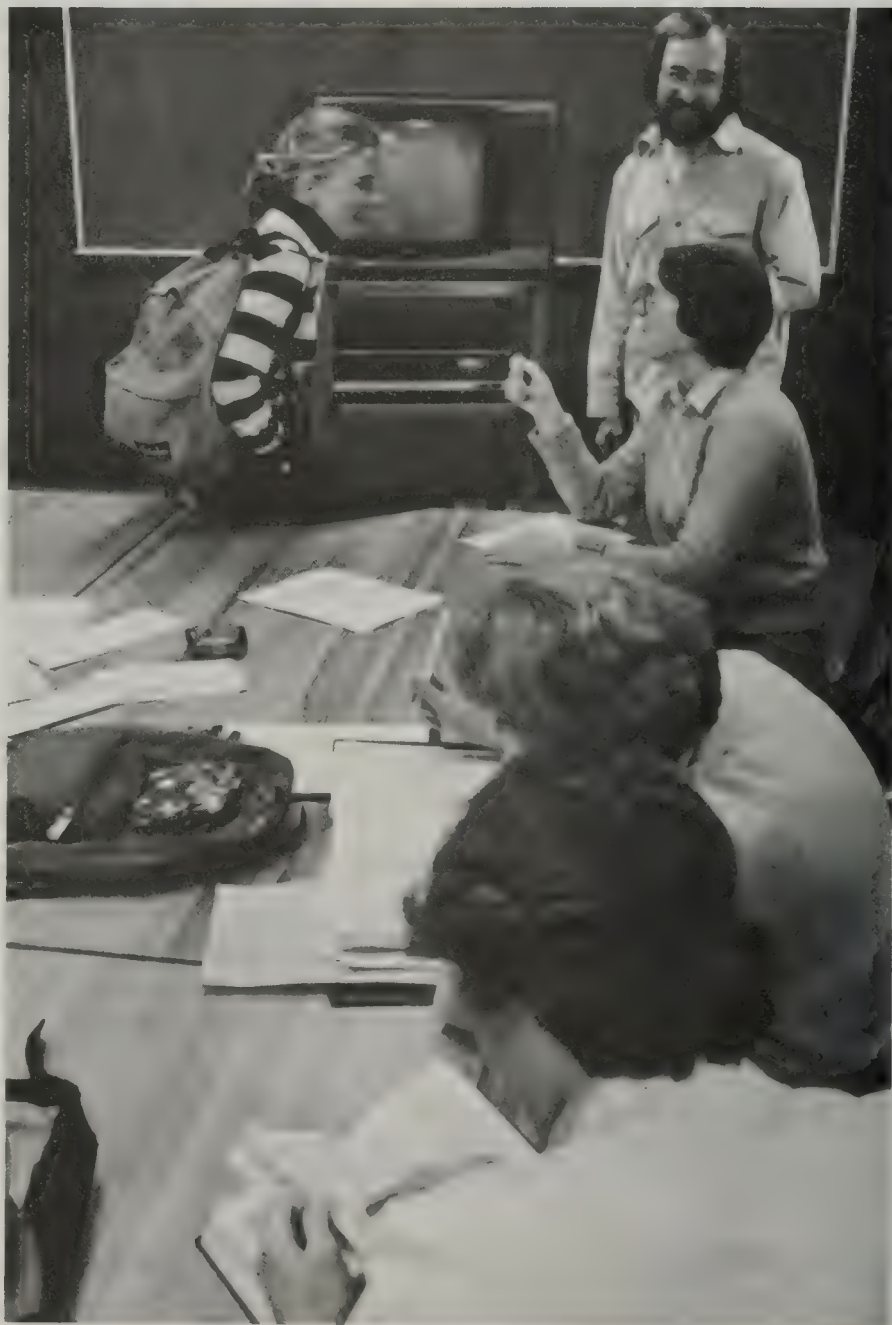
NURS-399. Select Topics or Independent Study. Students select a topic of professional interest from within the specialty area or in support of the specialty area, to be studied with a faculty member. Specific objectives, evaluation methods, and other requirements are determined prior to registering for the course of study. 1-3 credits.

Electives. Courses to be offered as electives will be developed by the nursing faculty in addition to courses offered by other departments and schools within the University. Elective courses are to be supportive of the area of specialization. 3-6 credits.

For additional information, please contact the Office of the Assistant Vice-President for Health Affairs and Dean of Nursing, Duke University Medical Center, Box 3714, Durham, North Carolina 27710, (919) 684-3786 or (919) 684-2402.

The Allied Health Programs

The Allied Health Programs



The Allied Health Programs

There are several health-services educational programs offered at the Duke University Medical Center that are neither medicine nor nursing. Every effort is made to keep each of these allied health programs closely related to the Medical School departments whose field they serve.

Several of today's allied health occupations require less than the baccalaureate level of education. Although the Duke University Medical Center has several such programs, they are often taught in junior colleges, technical institutes, or community hospitals. Such training programs in the latter institutions can frequently benefit from resources generally available only from medical centers, e.g., (1) in choosing programs appropriate to their resources and needs, (2) in developing articulated curricula, (3) in upgrading or attracting competent faculty, and (4) in arranging meaningful affiliations between the educational and the clinical care institutions that are required for many of these programs. The programs arrange, whenever possible, to help provide such resources to institutions located within the adjacent geographic region.

Programs in hospital administration and dietetics were initiated at the Medical Center in 1930. Programs in several disciplines dealing primarily with the laboratory aspects of clinical medicine began soon afterward. Due to marked advances in the field of medicine, new allied health programs were developed in the early 1960s to assist in the many medical specialties. Today there are approximately 300 students enrolled in Duke University allied health programs.

Resources for Study

All of the study facilities available to medical students are available to allied health students. See descriptions for Library/Communications Center, the Thomas D. Kinney Central Teaching Laboratory and Division of Audiovisual Education which may be found in a foregoing portion of this bulletin.

Several of the allied health programs have affiliations with other hospitals and medical institutions for clinical instruction.

Student Life

Living Accommodations. Because of the shortage of residential space, students enrolled in allied health certificate programs are not eligible for student housing. Student housing includes dormitories and apartments. To full-time students in degree (not certificate) programs, a limited number of apartments are available in the Central Campus apartment complex. No dormitory housing is available to any allied health

students. Suitable living arrangements are extremely limited in nearby areas. Students planning to live off campus should make arrangements in advance of matriculation date in order to be assured accommodations. Information concerning housing is provided on request by the Central Campus Office, Department of Housing Management, 217 Anderson Street, Durham, North Carolina 27705.

Dining Facilities. Several dining facilities located in and near the Medical Center are available to students. In the Duke University Union Building, there are two cafeterias and a dining room. There are also cafeterias in the Trent Drive Hall and the Veterans Administration and Duke hospitals.

Student Financial Aid. Duke University recognizes the responsibility of students and their families to provide funds according to their ability to achieve the educational objective. Students are encouraged to pursue every available source of support through their local and state student assistance programs.

All programs are approved for veterans education benefits (G.I. bill) for those who are eligible. Some of the programs have limited student support available through stipends or special scholarships.

Financial aid is available through Duke in limited amounts in the form of loans. When all institutional funds are pooled, the amount available to a totally needy student is inadequate to meet the school's recognized costs. Duke University is a lender under the Federally Insured Guaranteed Student Loan Program. A Financial Aid Form (FAF) or a Graduate and Professional Schools Financial Aid Service (GAPSFAS) form from applicants and their parents (and spouse, if applicable) is required in addition to the Duke University Financial Aid Application. A copy of the student's (and spouse's, if applicable) federal income tax return for the previous taxable year is required. In the case of the dependent student, a copy of the parent's federal income tax return for the last taxable year is also required. Duke University reserves the right to decline to approve loan applications for those applicants who do not have a satisfactory credit history. U.S. citizenship or permanent residence visa is required of all students receiving loans through the school.

It is the responsibility of recipients of financial aid to keep the Medical Center Office of Financial Aid informed of any outside financial assistance they may receive. It must be understood that Duke reserves the right to reconsider its offer of financial assistance in the event of a major outside award to a recipient. No financial aid funds may be used during a period when the recipient is not involved with work toward the degree or certificate. Part-time or special students are not eligible for financial aid.

Students who have been accepted for matriculation routinely receive financial aid applications. Annual reapplication is required of all financial aid recipients.

Pell Grant (formerly BEOG) is a federally funded grant for students with financial need who have not earned a baccalaureate degree and are enrolled in any postsecondary educational program. To apply the applicant completes a Financial Aid Form (FAF) which may be obtained from a high school guidance counselor or any financial aid office.

North Carolina Student Incentive Grant (NCSIG) is available to residents of North Carolina who are enrolled in any postsecondary educational program in North Carolina. The applicant must demonstrate substantial financial need and must not have earned a baccalaureate degree. Application deadline is 1 March for the following academic year. To apply the applicant completes a Financial Aid Form (FAF) requesting that the information be sent to College Foundation, Inc., 1307 Glenwood Avenue, Raleigh, North Carolina 27605. FAFs may be obtained from a high school guidance counselor, or financial aid office.

North Carolina Legislative Tuition Grant is a direct grant of \$850 from the state to each North Carolinian enrolled in a private educational institution in North Carolina who is studying toward the first baccalaureate degree. No application is required.

North Carolina Student Loan Program for Health, Science, and Mathematics. These loans provide financial assistance to North Carolina residents who demonstrate need as determined by the board. Loans are available for study in the medical fields, mathematics, and science programs that lead to a degree. The applicant must be a domiciliary of North Carolina and accepted as a full-time student in an accredited associate, baccalaureate, master's, or doctoral program leading to a degree. Loan recipients in professional or allied health program may cancel their loans through approved service in shortage areas, public institutions, or private practice. Medical students may receive \$6,000 per year for each of the four years; master's degree students are eligible for two loans of \$3,000 each; bachelor's degree students are eligible for three loans of \$2,500 each. For application forms and more information write: Executive Secretary, Board for Need-Based Student Loans, 116 West Jones Street, Raleigh, North Carolina 27605, or telephone (919) 733-2164.

Every effort will be made to assist the student with tuition and living expenses within the framework of school policies which may be in effect at the time. However, as funds are limited, prior indebtedness will not be given favorable consideration as part of the student's budget. A financial aid brochure and student budget for each allied health program are available, upon request, in the spring of each year. Any applicant having further questions may write to the Coordinator, Financial Aid, 126 Davison Building, Box 3005, Duke University Medical Center, Durham, North Carolina 27710.

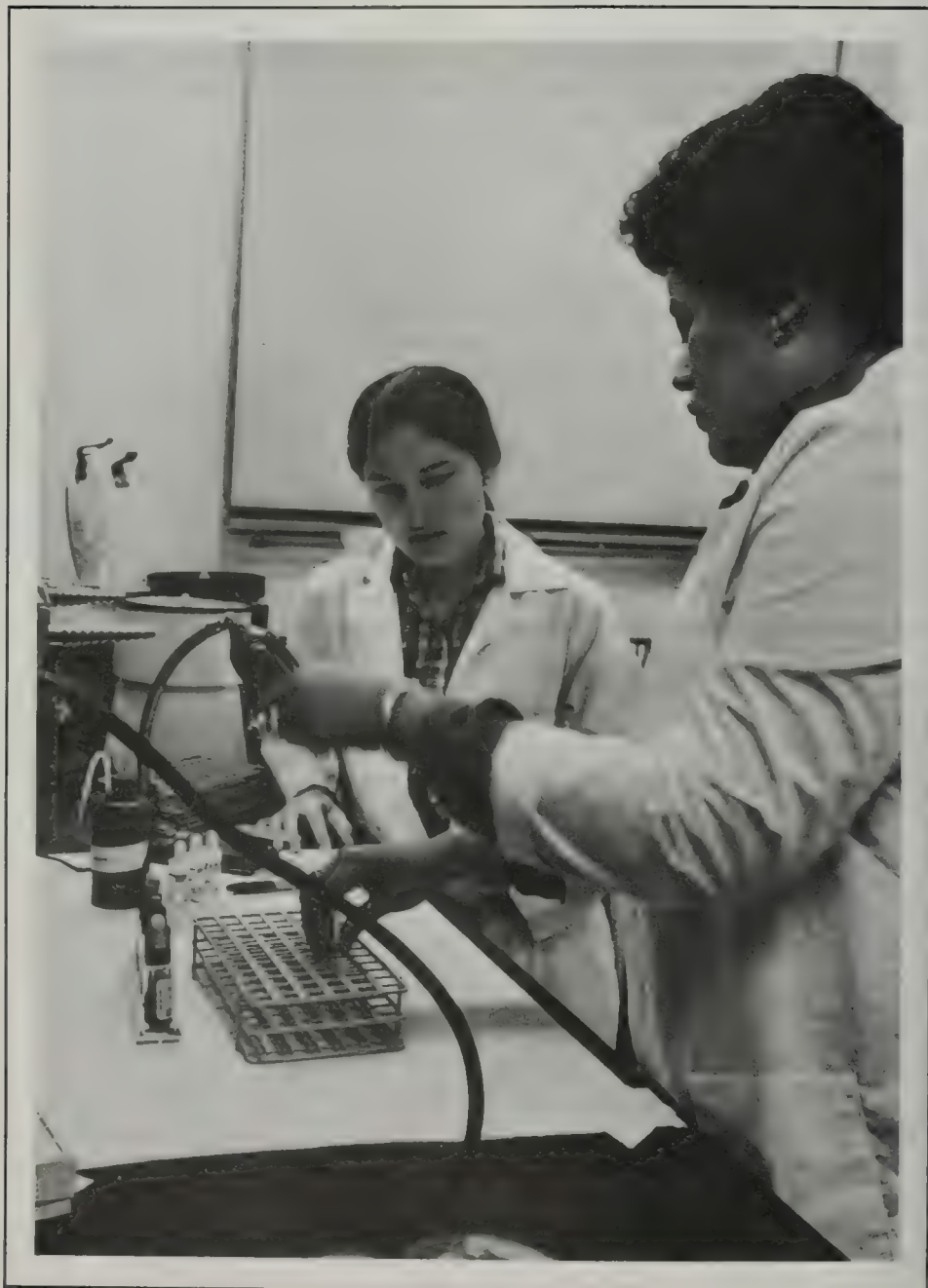
Student Health Service. Student health service, health insurance, and counseling and psychological services, fully described in an earlier portion of this bulletin are available to all allied health students.

Athletic Events. All students paying the full Duke University undergraduate tuition are issued Duke University identification cards and may attend all home intercollegiate athletic contests on a first-come, first-served basis. Graduate students and those enrolled in the certificate program may purchase a book of tickets for regular season home football and basketball games. All tickets are sold on a first-come, first-served basis. The ticket office is located in Cameron Indoor Stadium.

Judicial System and Regulations. Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University which are currently in effect or which are, from time to time, put into effect by the appropriate authorities of the University. At the same time, the individual is responsible for decisions and choices within the framework of the regulations of the community as Duke does not assume in loco parentis relationships.

Any student, in accepting admission, indicates a willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension or expulsion, for failure to abide by these regulations or for other conduct adjudged unsatisfactory or detrimental to the University. A copy of the Allied Health Judicial System including a code of ethics, rules of conduct, and judicial procedures will be provided each student.

Academic Procedures and Information



Admissions

Admissions to all Duke University educational programs are reviewed by an appropriate admissions committee. Students matriculating in the various allied health programs must meet the admission standards of that program.

Grading and Grade Requirements

Final grades on performance in academic work are sent to students after the examinations at the end of the fall and spring semesters.

Passing Grades. Passing grades are *A*, exceptional; *B*, superior; *C*, satisfactory; and *D*, low pass. A passing grade may be modified by a plus or minus. A *Z* may be assigned for the satisfactory completion of the first semester of a two-course sequence. This permits an instructor to assign an earned grade for the entire year during the grading period for the second course of the sequence.

The D Grade. Although the *D* grade represents low pass, no more than two courses passed with *D* grades may be counted among the thirty-two courses required for graduation.

Failing Grades. A grade of *F* or *U* (see pass/fail option below) indicates that the student has failed the course, which is recorded on the student's record. If the course is taken again, a second entry of the course and the new grade earned is made on the record, but the first entry is not removed.

Pass/Fail Grading Option. With the consent of the instructor and program director, a student may choose to be graded on a pass/fail basis in one elective course each semester or summer session.

A student enrolling in a course on a pass/fail basis completes all the work of the course but receives either a pass, (*P*), or fail, (*U*), in lieu of a standard grade. After the first two weeks of classes in any semester, no student may change to or from a pass/fail basis. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken on a regular credit basis.

Grades When Absent from Final Examination. In all cases in which a student is absent from a final examination, an *X* is received instead of a final grade. If the student does not present an acceptable explanation for the absence to the Office of the Dean for Undergraduate Medical Education within forty-eight hours after the scheduled time of the examination, the *X* is converted to an *F*. If the absence is excused by the Dean the student arranges with the instructor for a makeup examination. An *X*, not

cleared by the end of the semester following the examination missed, is converted to an *F*. See the section on Final Examinations and Excused Absences.

Grades for Incomplete Work. If because of illness or other emergency a student's work in a course is incomplete, an *I* may be received for the course instead of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise, the *I* is converted to an *F*. Seniors must complete all courses before graduation. A student whose work is incomplete and who is also absent from the final examination receives an *X* for the course.

For the purpose of determining if a student satisfies continuation requirements, an *I* is counted as failing to achieve satisfactory performance in that course.

Graduation and Continuation Requirements

Continuation Requirements. A student must achieve a satisfactory record of academic performance and make satisfactory progress toward graduation each semester. To remain in the University a student must not fail two or more courses in any semester. A student who, for any special reason, has been permitted to enroll for three or fewer courses must pass all courses.

Students are reminded that in cases where continuation is in question, incomplete work in any course is counted as a failure to achieve satisfactory performance in that course. Such courses must be completed in time for final grades to be submitted to the Registrar no later than the day preceding the opening of the spring semester or 15 June in the summer.

Any student excluded under the provisions of this regulation may request to have the case reviewed by the Dean, Undergraduate Medical Education.

Requirements for Degree. To be graduated a student must pass a minimum of thirty-two courses (including the sixteen courses required for admission) and all courses prescribed in the program of study. Of the courses required for graduation, no more than two courses with *D* grades will be accepted.

Residence Requirements. At least sixteen semester-courses must be completed satisfactorily at Duke. This must include the final four semesters.

Commencement

Graduation exercises are held once a year in May, when degrees are conferred on, and diplomas issued to those who have completed requirements by the end of the spring semester. Those who complete degree requirements by the end of a summer term or the end of a fall semester become eligible to receive diplomas dated 1 September or 30 December, respectively. There is a delay of about one month in the mailing of September and December diplomas because the diplomas are mailed after final approval by the Academic Council and the Board of Trustees. Any persons who receive diplomas dated 1 September or 30 December may return for the commencement weekend and participate in the graduation exercises in May following the date of the diploma.

Eligibility for Academic Honors

To determine eligibility for academic honors, only letter grades earned at Duke, with the exception of the *P* (pass) grade, enter into the calculation of the average.

Graduation Honors. Full-time or part-time students who earn the following averages for all work taken at Duke are graduated with honors: a 3.3 average earns a degree *cum laude*; a 3.6 average earns a degree *magna cum laude*, and an average of 3.8 or above earns a degree *summa cum laude*.

Course Information

The unit of credit for academic work is the semester-course. Double-courses and half-courses are recognized.

Transfer Credit. Duke credit may be granted for course work satisfactorily completed at other regionally accredited, degree-granting institutions. Courses in which grades of less than C have been earned are not accepted for transfer credit. Semester-course credit awarded at Duke for satisfactorily completed courses cannot, of course, be directly equated with semester-hour or quarter-hour credits. A semester's work accepted as a normal course load by the other institution transfers as a block of four course units at Duke, provided the courses taken at the other institution are acceptable by Duke as Duke course equivalents or electives. Ordinarily, transfer students will not be awarded more than four course units for one semester's work unless they have satisfactorily completed more than the normal course load at the institution from which they transferred. All courses approved for transfer credit are listed on the student's permanent record at Duke (unless the student has received a degree) but grades earned in such courses are not recorded. Courses taken at other institutions are evaluated by the Medical Center Registrar.

Students who transfer to Duke may receive credit for a maximum of two years of work at other institutions of approved standing. No credit is given for work completed by correspondence, and credit for no more than two semester-courses is allowed for extension courses.

Course Load and Eligibility for Courses. The normal and expected course load each semester is four to five semester-courses. To take fewer than four or more than five semester-courses in any semester, a student must have the approval of the program director and the Dean for Undergraduate Medical Education. No student, however, may take more than six courses in any semester.

Course Audit. With the written consent of the instructor and the program director, a full-time degree student is allowed to audit one or more courses in addition to the normal program. After the first two weeks of classes in any semester, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may change classification to an auditor. A student may not repeat for credit any course previously audited. Auditors submit no daily work, take no examinations, and receive no credit for courses.

Course Changes after Classes Begin. Students, with the approval of the program director, may drop and add courses during the first two weeks of classes. Courses added during the second week of classes require the approval of the appropriate instructor in addition to that of the program director.

Students may drop a course without penalty until the time midsemester grades are assigned if they are clearly carrying a course overload. Factors such as poor health or necessary outside work are also considered in permitting withdrawal from courses without penalty. A W is entered on the permanent record in lieu of a grade in all cases where withdrawal without penalty is approved. After the time limit has expired, withdrawal from any course will ordinarily result in a grade of F. Courses discontinued prior to midsemester without approval will also be assigned an F.

Class Attendance and Excused Absences

Responsibility for class attendance rests with the individual student. Students are expected to attend classes regularly and punctually and must accept the consequences of failure to attend. An instructor is privileged to refer students to the Dean for Undergraduate Medical Education for suitable action if, in the opinion of the in-

structor, their work or that of the class suffers because of absences. When excessive absences result in a student's failure to carry a normal course load, the Dean for Undergraduate Medical Education, after a conference with the student, will determine whether the student may continue enrollment in the college.

Absences from required classes and tests ordinarily are excused only for illnesses certified by a proper medical official of the University, and for authorized representation of the University in out-of-town events. Officials in charge of groups representing the University in such events are required to submit names of students to be excused to the Office of the Dean for Undergraduate Medical Education forty-eight hours before absences are to begin.

Final Examinations and Excused Absences

Customarily, an examination is the final exercise in an undergraduate course, but it is understood that not all courses profit from this process. Therefore, unless departmental policy stipulates otherwise, the conduct of the final exercise is determined by the instructor, except that a final written examination may not exceed three hours in length and a final take-home examination may not require more than three hours in the actual writing.

Absences from final examinations are excused by the Dean for Undergraduate Medical Education only in exceptional circumstances, such as illness certified by a medical official of the University or other conditions beyond the control of the student. A student who misses a final examination must notify the Office of the Dean for Undergraduate Medical Education within forty-eight hours after the scheduled time of the examination. Failure to so notify and to present an acceptable reason for absence from the examination will result in the student's receiving an *F* in the course.

Changes in Status

Withdrawal and Readmission. A student who wishes to withdraw from the University must give official notification to the Dean for Undergraduate Medical Education. Withdrawals at student initiative prior to the Thanksgiving recess in the fall semester or prior to 15 April in the spring semester are coded as voluntary, and a *W* is entered in lieu of a grade for each course. Voluntary withdrawals after these dates are permitted only in the event of emergencies beyond the control of the student.

Applications for readmission are made to the Medical Center Registrar. Each application is reviewed by the admissions committee of the program to which the student applies. A decision is made on the basis of several criteria including the applicant's academic record at Duke, the prospects of completing requirements for graduation, the student's citizenship record at Duke, evidence of increasing maturity and discipline, the degree of success attendant upon activities during the time away from Duke, and finally the applicant's relative standing among the group of students applying for readmission.

Leave of Absence. A student in good standing may apply in writing to the Dean for Undergraduate Medical Education to take a leave of absence for one or two semesters. The application must come before the end of the fall semester for a leave of absence during the spring semester, and before 15 July for a leave of absence during the fall semester. If the leave is approved, the student must keep the Dean informed of any change of address.

Full-Time and Part-Time Degree Status. Normally, undergraduate students who are candidates for degrees are expected to enroll for a normal course load each semester. A student who needs to change from full-time status, or from part-time to full-time status, must have the approval of the program director and the Dean for Undergraduate Medical Education. For special reasons approved by the program di-

rector and the Dean, a full-time degree student who is qualified to continue may register in a part-time degree status for no more than two courses.

Admission

Students seeking admission to the Bachelor of Health Science degree program must have completed two years of study at an accredited institution. In addition, they must have a minimum of sixteen course equivalents (sixty semester-hours/ninety quarter-hours) of transferable credit including at least one course in English, three in natural science, three in social sciences or history, and one in humanities. Additional requirements are listed in the description of the program.

Other Information

Release of Student Records. No confidential information contained in student records (academic or otherwise) is released to non-University persons or to unauthorized persons on the campus without the consent of the student. Consent is evidenced by each student's signing a form which authorizes the release of personal data. The form may provide for the release of information to one or more persons or agencies only, or it may be a blanket release. Blank forms to authorize or revise the permission are available in the office of the program directors.

Identification Cards. Undergraduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, University health services, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the Registrar's office. The cost of a new identification card is \$5.

Payment of Bursar Accounts for Fall and Spring. Monthly invoices for tuition, fees, and other charges will be sent by the Bursar's office and are payable by the invoice due date; no deferred payment plans are available. As a part of the agreement of admission to Duke University a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and also certain restrictions as stated below will be applied.

Late Payment Charge. If the total amount due is not received by the invoice due date, the next invoice will reflect a penalty charge of 1¼ percent assessed on to the past due balance. The past due balance is defined as the previous balance less any payments and credits received on or before the due date and also any student loan memo credits, related to the previous balance, which appear on the invoice. The amount of the 1¼ percent penalty charge will be the same regardless of the number of days payment is received after the due date.

Restrictions. An individual will be in default of this agreement if the total amount due on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Financial Information



Tuition and Fees*

Estimated Expenses for an Academic Year. Certain basic expenditures such as tuition, board, and room are to be considered in preparing a student's budget. Tuition and some fees vary by program. See each program for the appropriate amounts for this. For the Bachelor of Health Science program the estimated expenses are:

Tuition	\$7,050 first year; \$6,850 second year
Books, uniforms, and supplies	\$900 per year
Food	\$220 per month
Laboratory Fee	\$200
Lodging	\$235 per month
Student Health Fee	\$95 per semester
Student Accident and Sickness Insurance	\$173 per year (single) \$484 per year (married)
Miscellaneous (travel, laundry, clothing, etc.)	\$205 per month

Registration Fees and Deposits. On notification of acceptance, baccalaureate degree students are required to pay a nonrefundable first registration fee of \$30.* Students in the Physician Assistant Program are required to make a deposit of \$75. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, the deposit is applied to the cost of tuition.

Late Registration. Students who register in either semester at a date later than that specified by the University must pay to the Bursar a fee of \$25.

Part-time Students. In the regular academic year, students who register for no more than two courses in a semester are classified as part-time students. Part-time students are charged at the following rates: One course, \$880; half-course, \$440; quarter-course, \$220 Registration for more than two courses requires payment of full tuition.

Auditors. Auditing of one or more courses without charge is allowed students paying full fees, provided that the consent of the instructor is obtained. In 1985-86 students enrolled for one or two courses may audit other courses by payment of \$103 for each course audited. With the consent of the appropriate instructor and the Registrar, graduates of Duke may audit undergraduate courses for \$103 each course.

Duke Employees. Full-time employees with one or more years of service with the University may request permission to take for credit or audit up to two courses

*These are estimated figures only. Tuition and fees are subject to change without notice.



during any one semester. Permission may be granted based on the individual merits and circumstances of each application. Employees receiving permission to take such courses for credit will be charged one-half of the tuition rate for part-time students as shown above. Employees are required to submit a formal application by 1 December or 15 July.

Fees for Transcripts. Requests for transcripts of academic records should be directed to the Office of the Medical Center Registrar. A minimum fee of \$1, payable in advance, is charged for each copy.

Student Health Fee. All regular full-time students and part-time degree candidates (undergraduate, graduate, and professional) are required to pay the health fee that is nonrefundable after the first day of classes in the semester. The student health fee entitles the student to outpatient treatment through the Student Health Service or inpatient treatment in the Infirmary. The health fee is not to be confused with the Duke Student Accident and Sickness Insurance (the premium for this insurance is minimized due to the existence of the Student Health Services) which covers a large number of medical costs above and beyond the treatment available through the Student Health Services. The identification of a separate student health fee in no way changes the policy concerning the Student Accident and Sickness Insurance. A Stu-

dent Health brochure will be distributed at the time the semester enrollment card is picked up at the beginning of the term.

Student Accident and Sickness Insurance. At time of matriculation, students must provide proof of coverage under an accident and sickness insurance policy or purchase the Duke Student Accident and Sickness Insurance policy. This insurance policy provides protection twenty-four hours per day during the twelve-month term of the policy of each student insured. Students are covered on and off the campus, at home, or while traveling between home and school and during interim vacation periods.

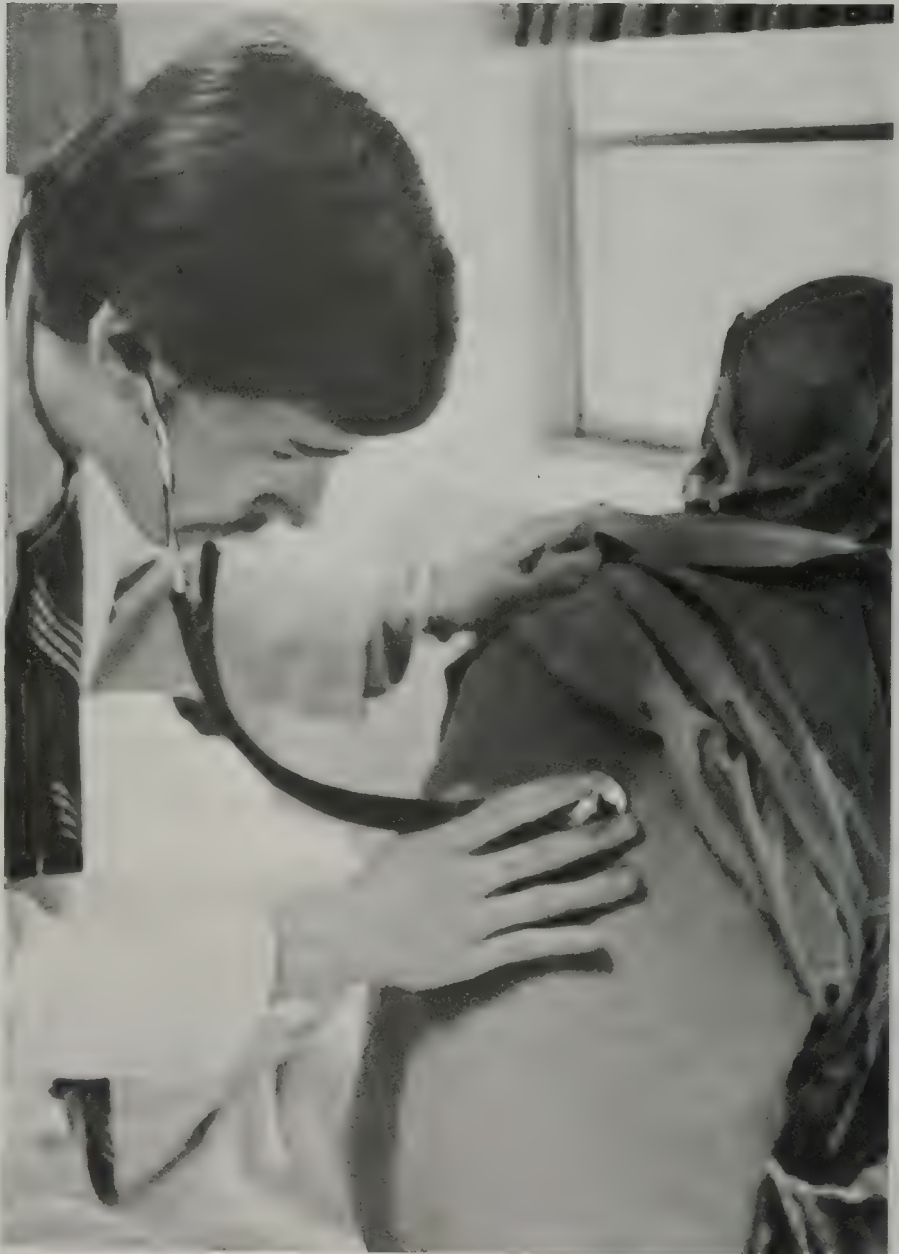
Refunds

If a student withdraws, tuition is refunded according to the following schedule:

<i>Withdrawal from the Baccalaureate Program</i>	<i>Refund</i>
Before classes begin	Full amount
During first or second week	80%
During third to fifth week	60%
During sixth week	20%
After sixth week	None
 <i>Withdrawal from Certificate Programs*</i>	 <i>Refund</i>
Before classes begin	Full amount
During first week	80%
After first week of classes	None

*Course fees for students in certificate programs are payable on a yearly basis.

Bachelor of Health Science Degree Program



Duke University Medical Center awards a Bachelor of Health Science degree to students who complete the Physician Assistant Program.

Physician Assistant Program

PHYSICIAN ASSISTANT PROGRAM ADMINISTRATION

Chairman: E. Harvey Estes, Jr., M.D., *Department of Community and Family Medicine*
Program Director: Reginald D. Carter, Ph.D., PA-C, *Assistant Professor of Community and Family Medicine*
Medical Director: Michael Hamilton, M.D., *Assistant Professor of Community and Family Medicine*
Clinical Coordinator: Jack Lord, PA-C, *Clinical Associate*
Educational Coordinator: Vicki Scott, PA-C, *Clinical Associate*
Surgical Coordinator: Paul Hendrix, PA-C, *Medical Research Associate*
Pediatrics Coordinator: Marcia Herman-Giddens, PA-C, *Clinical Associate*
Clinical Site Coordinators: Don Mattingly, PA-C; Joyce Nichols, PA-C; James Schmidt, PA-C

TEACHING STAFF AND FACULTY

Michael A. Hamilton, M.D., *Patient Assessment, Anatomy and Physical Diagnosis*; Reginald D. Carter, Ph.D., PA-C, *Anatomy and Physical Diagnosis, Medical Sciences*; Vicki Scott, PA-C, *Patient Assessment, Physical Diagnosis, Perspectives on Health, Medical Sciences, Behavioral Medicine*; Jack Lord, PA-C, *Patient Assessment, Physical Diagnosis*; Katherine Halpern, PA-C, *Anatomy and Physical Diagnosis*; Michael Burkhill, PA-C; Max Isbell, PA-C; Tom Hill, PA-C; Mark Wildman, PA-C, *Anatomy and Physical Diagnosis*; Paul Hendrix, PA-C, *Anatomy, Fundamentals of Surgery*; Marcia Herman-Giddens, PA-C, *Introduction to Pediatrics*; Leaf Diamant, M.A., *Psychodynamics*; Joseph Kertesz, M.A., *Psychodynamics*; Suydam Osterhout, M.D., *Microbiology*; Margaret Schmidt, MT(ASCP)SH, M.A.T., *Medical Technology*; Iris W. Long, MT (ASCP), M.A.T., *Laboratory Sciences*; Collins Baber, M.D., *Radiology*; Joseph C. Greenfield, M.D., *Professor and Chairman, Department of Medicine, and Staff, Internal Medicine*; David Sabiston, M.D., *Professor and Chairman, Department of Surgery, and Staff, Surgery*; Samuel Katz, M.D., *Professor and Chairman, Department of Pediatrics, and Staff, Pediatrics*; Bernard J. Carroll, M.D., *Professor and Chairman, Department of Psychiatry, and Staff, Psychiatry and Behavioral Sciences*; Samuel Warburton, M.D., *Family Medicine*; Harvey Estes, Jr., M.D., *Community Medicine*

In addition to the above, the program calls upon teaching resources of affiliated community practitioners and members of the Departments of Medicine, Surgery, Obstetrics/Gynecology, and Pediatrics.

ADVISORY COMMITTEE TO THE PHYSICIAN ASSISTANT PROGRAM

The Advisory Committee to the Physician Assistant Program meets once yearly to review and advise the program's administration concerning broad goals of the program. This committee consists of Duke faculty, community practitioners, nurses and nurse practitioners, health care consumers, health planners, and P.A. students and graduates.

In 1965 Duke University Medical Center began an innovative program designed to prepare highly educated and well-trained assistants for physicians. The program originated when clinicians at the Medical Center realized that they could enhance their productivity by safely and effectively delegating many of their tasks and responsibilities to nonphysicians, primarily ex-military corpsmen with previous health-re-

lated education and experience. Dr. Eugene A. Stead, Jr., then Chairman of the Department of Medicine at Duke, recognized the potential of the corpsmen experience and concluded that paramedical personnel might be trained to provide primary health care under the supervision of a physician. In developing the Department of Community and Family Medicine, Dr. E. Harvey Estes, Jr. foresaw that midlevel practitioners would help increase consumer access to health services, and extend the time and skills of the physician in providing comprehensive health care.

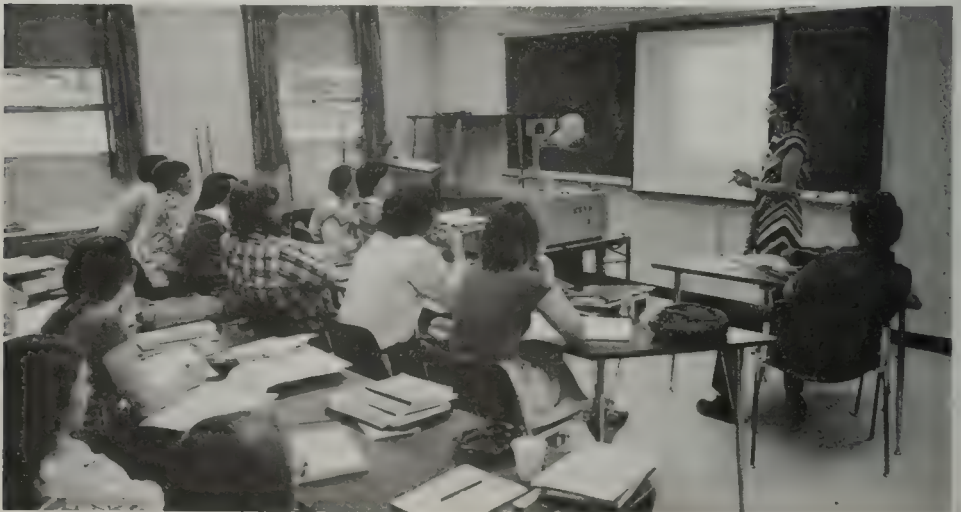
The physician assistant possesses a broad understanding of medicine and health care. Men and women are chosen for the program on the basis of their humanistic perspective, demonstrated commitment to providing health care, and their academic potential.

On completion of the two-year program, graduates are prepared to assist in the evaluation and management of common health problems, including both acute self-limited problems and chronic illnesses such as hypertension and diabetes. Recognizing the intrinsic relationship between emotional and physical health, the program stresses competence in the exploration of psychosocial concerns. Graduates are expected to have a basic fund of knowledge pertaining to health needs of infants and children, young and middle-aged adults, and geriatric patients. Physician assistants also provide patient care services such as diagnostic and therapeutic procedures, wound suturing, cast application, and basic laboratory procedures.

Upon successful completion of the program, Duke University Medical Center awards the student a Bachelor of Health Sciences degree and a Physician Assistant Certificate.

Program of Study. The curriculum is twenty-three consecutive months in duration and is designed to provide an understanding of the rationale for skills used in physical diagnosis and problem assessment. It focuses primarily upon the common problems seen in ambulatory care settings, so that the student is able to utilize and understand the various diagnostic, therapeutic, and supportive measures used by the primary care physician. The first ten months are devoted to the basic medical and behavioral sciences and the remaining thirteen months to clinical training in a variety of practice settings. The rigorous curriculum requires people who have had college level education and experience in a health-related discipline.

The preclinical curriculum is integrated in such a way as to introduce the student to medical sciences as they relate to clinical problems. Learning strategies include self-



instructional study guides, teaching patients, lectures, seminars, laboratories, and small-group encounters. Clinical medicine and patient evaluation are taught using the problem-oriented medical record format. The psychosocial aspects of clinical practice are emphasized as well as the physical aspects of disease processes.

As part of the clinical practicum students are required to take rotations in inpatient medicine, surgery/emergency services, family medicine, pediatrics, obstetrics/gynecology, and behavioral medicine. The final ten weeks of clinical training is spent away from Duke in a community setting.

Because the clinical teaching is carried out in many practice settings, students should plan on being away from the Durham area for part of their clinical experience.

Curriculum. Before proceeding into the clinical phase of the curriculum, students must satisfactorily complete the following:

Preclinical Schedule

<i>Fall Semester</i>		<i>Course Weight</i>
CFM 103	Medical Sciences for Clinical Practice I	1 1/2
CFM 112	Anatomy and Physical Diagnosis I	1/2
CFM 114	Patient Assessment I	1/2
CFM 106	Psychodynamics I	1
CFM 101	Perspectives on Health	1/2
PTH 115	Clinical Diagnostic Procedures	1
		<u>5</u>
<i>Spring Semester</i>		<i>Course Weight</i>
CFM 104	Medical Sciences for Clinical Practice II	1 1/2
CFM 113	Anatomy and Physical Diagnosis II	1/2
CFM 115	Patient Assessment II	1/2
CFM 107	Psychodynamics II	1
MIC 101	Introductory Microbiology	1/2
SURG 101	Fundamentals of Surgery	1
		<u>5</u>
<i>Summer Term 1</i>		<i>Course Weight</i>
CFM 105	Introduction to Pediatrics	1

After satisfactory completion of all basic science courses, students must complete the following:

Clinical Schedule

MED 150. General Medical Inpatient Service	2 courses	8 weeks
SURG 150. General Surgery	1 course	4 weeks
SURG 151. Outpatient/Emergency Surgical Service	1 course	4 weeks
OBG 150. Obstetrics and Gynecology	1 course	4 weeks
PED 150. Pediatrics	1 course	4 weeks
CFM 151. Family Medicine	1 course	4 weeks
CFM 152. Behavioral Medicine	1 course	4 weeks
		<u>32 weeks</u>
		8 courses

In addition to the above courses required for the B.H.S. degree, students must complete:

Four elective courses required for certificate	16 weeks
	Subtotal: 48 weeks
Final Preceptorship†	6 weeks
	<u>Total: 54 weeks</u>

†This rotation is taken only during the summer of the last year.

Prerequisites for Admission. To be eligible for the Bachelor of Health Sciences program, applicants must complete by 15 January (the application deadline) 60 se-

mester-hours of college credit from an institution whose credits are transferable to Duke University and which include one English course, one humanities course, three courses in the social sciences, and three courses in the natural sciences (two of which must be chemistry and biology). Of equal importance to the academic requirement is a minimum of six months of health care experience. This experience should involve direct patient contact and may be gained as a nurse, patient care assistant, military corpsman, or in other related fields such as medical technology, physical therapy, and counseling in health-related fields.

Application Procedures. Application materials and course bulletins are mailed to prospective applicants from 1 June through 15 December each year. Applications are accepted by the University no earlier than 1 September and no later than 15 January for the new class which enters in late August each year. Applications must contain:

1. a completed Duke University Medical Center Allied Health application form, including a nonrefundable fee of \$30;
2. official transcripts from all colleges or other academic institutions attended;
3. Scholastic Aptitude Test Scores of the College Entrance Examination Board, if already taken;
4. three letters of recommendation, to include one from an immediate supervisor and one from a physician with whom the applicant has worked.

Selection Factors. The program has a specific interest in enrolling students from diverse social, ethnic, and educational backgrounds. Emphasis is placed upon personal maturity, quality of health care experience, dedication to the health field, and intellectual capacity. Information submitted by each applicant is carefully reviewed by the Committee on Admissions, and selected applicants are invited to Duke University for personal interviews. These interviews usually take place in mid-March of each year; students are chosen from among those interviewed. All applicants will be notified by 15 April regarding admission to the program. Requests for application forms and information should be directed to the Coordinator of Admissions, Physician Assistant Program, P.O. Box CFM-2914, Duke University Medical Center, Durham, North Carolina 27710.

Financial Aid. The financial aid office works closely with students to secure loans. Due to the limited amount of money available, requests are considered individually and approved on the basis of financial need. Part-time employment for students is available in many areas of the Medical Center. Frequently such employment may net students about \$200 per month and yet not jeopardize their education. Students must comply with the academic schedule and are prohibited from working more than twenty hours per week.

Courses of Instruction

Courses numbered from 150 through 189 either list specific prerequisites or have as prerequisite the completion of the junior year in one of the programs.

Double numbers separated by a hyphen indicate that the course is a year course and must normally be continued throughout the year if credit is to be received.

ANESTHESIOLOGY

ANE 100. Anatomy and Physiology. A lecture and discussion course that examines the structure and function of human cells, tissues, and organs with emphasis on the implications for anesthesiology. This course also includes the appropriate pathology that may influence anesthetic management. Three courses. *Glenn, Tobias, and Hall*

ANE 105. Biochemistry and Physics of Anesthesia. The lecture/discussion format is used to present the principles of chemistry and physics that are applicable to the practice of anesthesia. Topics included are matter and atomic structure, molecular motion, energy, gases and gas laws, fluids and fluid flow, volatile agents and vaporizers, organic chemistry, biochemistry, fire and explosion, electrical hazards, and other topics. One course. *Tobias, Osborne, and Tacchi*

ANE 110. Cardio-Respiratory Physiology. A comprehensive presentation of respiratory and related cardiovascular physiology which is designed to provide amplification and reinforcement of ANE 100. One course. *Lumb*

ANE 120. Fundamentals of Anesthetic Practice I. This course provides the student with a basic knowledge of narcosis, uptake and distribution of anesthetic agents, and patient management during and after anesthesia. Anesthetic risk, accidents, and sequelae are integrated into the theory, operation, and maintenance of anesthetic equipment. Additionally, anesthetic techniques including endotracheal procedures, ventilators, positions, hypothermia, and monitoring are presented utilizing lectures, demonstrations, and practice. Also discussed are the legal, historical, and ethical aspects of anesthesiology. Two courses. *Glenn, Stump, and staff*

ANE 130. Pharmacology of Anesthesia. This course presents the basic principles of pharmacology necessary to understand the uptake, distribution, metabolism, and elimination of anesthetic agents and adjunct drugs that are used in the practice of anesthesia. Drug interactions and adverse drug reactions are also presented. The descriptive pharmacology of the drugs utilized in anesthesia and by the patient before, during, and after are also discussed according to their classifications, i.e., cholinergic drugs, narcotics, local anesthetics, neuromuscular blockers, cardiac drugs, etc. Two courses. *Stump*

ANE 150. Introduction of Clinical Anesthesia. An orientation to the operating rooms and the anesthesia department at Duke University Medical Center. Early in this course the student is primarily an observer of the daily routine and the administration of anesthesia. The student is also exposed to related areas in his/her orientation to the field of anesthesiology (recovery room, respiratory therapy, and obstetrics). As the course concludes the student participates in the administration of anesthesia to surgical patients. One course. *Staff*

ANE 121-122. Fundamentals of Anesthetic Practice II and III. This course presents timely topics and issues in anesthesiology as well as a review of basic anesthesia theories and principles. Topics include: blood gas interpretation, monitoring techniques, new agents and techniques, anesthetic management for common and uncommon diseases. This is a continuous sequence which covers the entire academic year. One course each. *Staff*

ANE 170-177. Clinical Anesthesia Rotations. The student rotates through the various surgical services while administering anesthesia under the constant supervision of the anesthesia staff. During eleven rotations the student builds his or her skill in patient management, anesthetic techniques, and equipment. The rotations are orthopaedics, neurosurgery, cardio-thoracic, general surgery, obstetrics, gynecology, urology, plastic-maxillofacial, otolaryngology, ophthalmology, and pediatrics. Two courses each. *Staff*

COMMUNITY AND FAMILY MEDICINE

CFM 101. Perspectives on Health. An overview of factors which impact the planning, delivery, and utilization of health care services. Issues considered include cultural expectations, behavioral characteristics of illness, political and economic implications of health policy, epidemiological methods, distribution of resources, and

ordering of priorities. Research and techniques of health education and preventive medicine are discussed as part of a critique of the present acute care, specialty oriented system. Time will be spent discussing the role and impact of the physician assistant in the health care system. One-half course. *Scott, Lord, and staff*

CFM 103-104. Medical Sciences for Clinical Practice. A system of self-instructional tutorials, enrichment sessions, and clinical correlations provide the student an opportunity to learn the rationale underlying the delineation and management of common clinical problems seen by primary care practitioners. Presentations in anatomy, physiology, biochemistry, pathology, and pharmacology are unified and integrated with clinical medicine, using an organ systems approach. The course provides the student with an interesting, intelligent, and pragmatic account of modern concepts in medicine and medical sciences. Three courses. *Carter, Scott, Hamilton, and staff*

CFM 105. Introduction to Pediatrics. The purpose of this course is to introduce students to clinical problems commonly seen in ambulatory pediatrics. Through lectures and demonstrations, students learn basic concepts and practical approaches to the maintenance of health and the management of illness in infants and children. In small group sessions, students develop skills necessary to assess the normal development of children and to define an appropriate data base for specific clinical problems. Physical assessment and diagnostic techniques are demonstrated. The psychological, pharmacological, and nonpharmacological management of pediatric patients are discussed. This course is taught by members of the Department of Pediatrics. One course. *Herman-Giddens and staff*

CFM 106-107. Psychodynamics. This course presents an extensive view of human behavior while concurrently developing skills that facilitate interpersonal awareness and psychological intervention. Didactic information is put into practice as students learn interviewing and counseling skills. The understanding of self is encouraged as the first step toward the helping of others. This course is divided into four subunits: psychiatry; communications, counseling, and interviewing; human growth and development and behavioral medicine. Two courses. *Kertesz, Diamant, Scott, and staff*

CFM 112-113. Anatomy and Physical Diagnosis. This course is taught by the program staff and clinicians from the Department of Surgery and Medicine. Students learn functional and applied anatomy as it applies to physical diagnosis and common clinical findings. Course content is sequenced to correlate with material presented in the Medical Sciences for Clinical Practice Course (CFM 103-104). Teaching methods for the anatomy component of the course include lectures, cadaver prosections, and audiovisual materials. Physical diagnosis is taught primarily through supervised practice of physical diagnosis skills. One course. *Hamilton, Hendrix, Carter, Scott, Lord, Wildman, Halpern, Isbell, and staff from the Departments of Medicine and Surgery*

CFM 114-115. Patient Assessment. This course is taught by the program staff and clinicians from the Department of Medicine. Students learn and practice skills in medical interviewing and physical assessment, clinical decision making, and the accurate and efficient recording and presentation of clinical information. Teaching methods include lectures, small group seminars, role playing, and the supervised examination of patients. One course. *Hamilton, Scott, Lord, and staff from the Department of Medicine*

CFM 150. General Community Medicine. During this rotation students spend time with physicians in community practice, observing and participating in both office-based and hospital care. Students gain experience in doing both problem-specific and complete evaluations and through follow-up visits have an opportunity to monitor the results of therapy. Students learn to appreciate the impact of a patient's total environment on their health status. One or two courses. *Staff*

CFM 151. Family Practice. A four-, or eight-week clinical experience surveying the components of family practice, including emotional conflicts and interpersonal relationships with the patient and other members of the family unit. Through experience in interviewing and examining patients, the student is exposed to the multifaceted approach of understanding and treating physiologic and sociologic components of disease processes. In this situation, an understanding of the common diseases treated by primary care practitioners and the aspects of the unique relationship a physician's associate experiences with private patients, their physician, and other health team members is developed. One or two courses. *Warburton and staff*

CFM 152. Behavioral Medicine. A four-week clinical experience in behavioral sciences. Four days each week are spent at a facility involved in the treatment of behavioral disorders (i.e., community psychiatry, inpatient psychiatry, outpatient psychiatry, alcoholism treatment, etc.). Students learn and participate in the diagnosis and treatment of patients cared for at that site. One day each week is spent in a seminar reviewing interviewing skills and selected topics related to the patients seen at the various sites. One course. *Kertesz and staff*

CFM 180. Final Preceptorship. This rotation is required of all students during the final six weeks of their training and provides a transition between the role of the student and graduate physician's associate. Students are encouraged to select a preceptor in the area of their anticipated employment and, during this period of time, to explore the tasks and team aspects of functioning as a midlevel practitioner. Students will provide health services consonant with their backgrounds, clinical experiences, and the needs of the particular practice setting. Required for certificate. Two and one-half courses. *Lord, Hamilton, and staff*

CFM 191. Independent Study. This special four-week course enables students to select individually with program administrators a series of objectives and to develop a program that can reasonably be expected to achieve those objectives. One course. *Estes, Hamilton, and staff*

MEDICINE

MED 150. Inpatient Medicine. An eight-week full-time required clinical rotation in which the student learns to apply basic medical knowledge to the problems and situations encountered on an inpatient service. By collecting a data base, formulating a complete problem list, participating in daily rounds, and participation in the management of patient problems, the student develops an awareness and understanding of the multiple aspects of disease processes and becomes familiar with therapeutic regimen and dispositions relative to specific disease states. The student will present the data base of each new patient to the supervising physician or attending rounding physician in a coherent, concise fashion. Two courses. *Staff*

MED 151. Outpatient Medicine. During this rotation, the student learns to apply basic medical knowledge to the common problems and situations encountered on an outpatient/emergency service. Experience may include long-term follow-up of patients with chronic disease, emergency triage and management, and evaluation of acute self-limited problems. This rotation occurs in an institutional as opposed to a private setting. One or two courses. *Staff*

MED 152. Intensive Care. A four-week rotation that acquaints the student with the acute and intensive care required for patients who have undergone major and complex surgical procedures, suffered massive and severe trauma, cardiorespiratory collapse, or other life-threatening medical crises. Emphasis is placed on ventilatory assistance, cardiopulmonary resuscitation, fluid and electrolyte replacement, and acid-base balance under resident physician supervision. One course. *Staff*



MED 153. Cardiology. During the rotation students will become familiar with the presentation, evaluation, and management of cardiovascular disorders, including acute and chronic problems. Students will gain experience performing the medical history and physical examination and will learn appropriate diagnostic procedures and therapeutic regimens, including drug therapy, alterations in life patterns (smoking, diet, exercise, etc.), and surgical intervention. One or two courses. *Cardiology staff*

MED 155. Endocrinology. A four- or eight-week rotation designed to acquaint the student with endocrinological diseases. The emphasis is placed on obtaining the defined endocrine data base and appropriate treatment of the disease. Students attend all daily rounds and conferences while on the service. They are taught the indications, limitations, and methods of performing diagnostic procedures including: glucose, tolbutamide, and arginine tolerance tests; thyroid function tests; and urinary steroid determinations. Students help educate patients with endocrine diseases about their disease processes, diagnostic evaluations, and therapies. One or two courses. *Endocrinology staff*

MED 156. Gastroenterology. During this four- or eight-week rotation students study the diagnosis, pathophysiology, and essentials of therapy of various gastroenterologic problems. They learn to perform and interpret the following diagnostic procedures: nasogastric intubations and gastric analyses (both with and without fluoroscopy), secretin tests, rectal and small bowel biopsies, proctoscopies, sigmoidoscopies, and gastroscopies. They also learn to care for endoscopic and biopsy instruments and biopsy specimens. One or two courses. *Gastroenterology staff*

MED 157. Hematology-Oncology. During this four- or eight-week rotation the students become familiar with the presentation of hematologic and oncologic problems, including many which are serious and life-threatening. A major objective for the student will be learning to relate supportively to the feelings and needs of terminally ill patients. The student will also gain experience with various diagnostic procedures, including white cell differential, bone marrow aspiration, lumbar puncture, paracentesis and thoracentesis. Students will become familiar with the principles of blood transfusion. One or two courses. *Hematology staff*

MED 159. Pulmonary Medicine. A four- or eight-week rotation that provides an in-depth exposure to patients with respiratory conditions. The problems encountered by patients who have respiratory ailments are studied in detail as are the associated special history and physical examination techniques, diagnostic and therapeutic procedures. The student participates in daily rounds and teaching conferences on respiratory diseases and gains a knowledge of the therapeutic regimen, their indications, availability, reliability, and limitations in the treatment of respiratory and allergic diseases. One or two courses. *Pulmonary staff*

MED 160. Nephrology. During this four- or eight-week rotation, the student learns to gather and record information in a problem-oriented manner about patients with renal and hypertensive diseases. The student becomes able to recognize the effects of disease, therapy, and education on the patient's course and plays a major role in patient education. The fundamentals of renal function, urinalysis, radiography of the chest, urinary system and bones, and the principle of dialysis are covered. One or two courses. *Nephrology staff*

MED 161. Neurology. On this rotation, students learn about the presentation, evaluation, and management of patients with neurologic problems. The student develops an understanding of specialized history and physical techniques and diagnostic procedures, including electroencephalography, brain scan studies, pneumoencephalography, and central nervous system radiologic studies. Students also

learn to relate supportively to patients whose symptoms may be frightening and/or have a serious prognosis. One or two courses. *Neurology staff*

MED 162. Rheumatology. This course provides the student with an indepth exposure to rheumatologic disease. Students gain insight into the psychosocial adjustments necessitated by chronic, potentially disabling disease. Students also gain familiarity with diagnostic procedures, therapeutic regimens, and learn how to do a meticulous and thorough joint examination. One or two courses. *Rheumatic and genetic diseases staff*

MED 163. Dermatology. During this rotation students gain familiarity with major classes of dermatologic diseases, ranging from acute self-limited problems to malignant conditions. Sensitivity to the negative effects of cosmetic disfigurement is stressed. Students gain experience with common diagnostic procedures and courses of treatment. One or two courses. *Tindall and dermatology staff*

MED 165. Clinical Infectious Disease. During this four-week rotation, the student learns to approach patients presenting with infectious diseases, to gather a data base from them, and to understand the manifestations of the illnesses and the rationale for therapy. One course. *Staff*

MED 191. Independent Study. This course is intended to allow students with particular interests in an area of internal medicine to structure a need-specific learning experience. Independent studies are arranged with the program staff and appropriate clinical faculty. One or two courses. *Staff*

MICROBIOLOGY

MIC 101. Introductory Microbiology. An introduction to diagnostic microbiology covering such topics as microbial morphology, staining characteristics, growth requirements, diagnostic tests, and antibiotic susceptibility testing. The clinical aspects of such subjects as pyogenic cocci, gram negative sepsis and nosocomial infection, meningitis, venereal disease, enteric infection, anaerobic pathogens, tuberculosis, mycotic diseases, viral infections, and the use of antibiotics are also included. One-half course. *Osterhout*

OBSTETRICS AND GYNECOLOGY

OBG 150. Obstetrics/Gynecology. During this rotation students learn about the health, needs, and concerns of women. Students learn about pregnancy, including prenatal care and management of labor and delivery. The student is expected to be fully familiar with the normal course of pregnancy and with common complications in order to provide educated and sympathetic support for the prospective mother. Students will also gain experience with common gynecologic concerns, including cancer detection, abnormal menstruation and bleeding, infections, and sexual dysfunction. Familiarity with the effectiveness, indications, and contraindications of various forms of contraception is a further objective. One or two courses. *Staff*

OPHTHALMOLOGY

OPH 150. Ophthalmology. This is a four- or eight-week rotation reviewing the major ophthalmologic disease. Through lectures, teaching rounds, and learning special history and physical examination techniques, the student develops an expertise in determining visual fields, visual acuity, and oculotometry. The principles of refraction and the many medical and surgical therapeutic regimens available for treating ophthalmologic disorders are included. The student is also required to participate in the routine care of ophthalmologic inpatients and outpatients. One or two courses. *Staff*

PATHOLOGY

PTH 115. Clinical Diagnostic Procedures. Students develop skills for performing routine hematologic, urinary, and microbiological procedures suitable for emergency or office/clinic practice. Lectures and discussions are concerned with clinical interpretation and appropriate applications of laboratory data and physiologic derangements which frequently produce abnormal laboratory values. Basic principles of electrocardiography are presented also. A \$50 laboratory fee is required. One course. *Widmann, Schmidt, and Long*

PEDIATRICS

PED 150. Community Pediatrics. The major objective of this rotation is to provide students with an overview of community pediatric practice. Students will gain familiarity with normal growth and development and developmental evaluation, pediatric preventive medicine, and evaluation and management of common childhood illnesses. Special emphasis is placed on communication skills and relating sensitively to both children and parents. Each student will spend time in the newborn nursery and be involved with hospitalized patients. One or two courses. *Herman-Giddens and staff*

PED 152. Intensive Care. A four-week rotation that acquaints the student with the acute and intensive care required for patients who have undergone major and complex surgical procedures, suffered massive and severe trauma involving multiple organ systems, or experienced sudden cardiorespiratory collapse or other life-threatening medical crises. Emphasis is placed on ventilatory assistance, cardiopulmonary resuscitation, fluid and electrolyte replacement, and acid-base balance under resident physician supervision. Prerequisite: PED 150. One course. *Staff*

PED 153. Pediatric Chest and Allergy. During this four- or eight-week rotation the student is taught to obtain a complete history and physical examination with emphasis on the allergy data base and the structure of the family. Students gain understanding of the impact of chronic illness on children and their families. They gain an understanding of home care programs and are able to alter them to fit a family's ability and resources. The student carries out appropriate diagnostic procedures and assesses the results for children with pulmonary disease. One or two courses. *Staff*

PED 154. Full-Term Nursery. During this four- or eight-week rotation the student learns to collect the maternal history accurately and completely; to recognize those maternal conditions imposing risks on the full-term infant; to collect samples for newborn screening laboratory exams; to examine a full-term infant and distinguish those who are abnormal from those who are normal; and to give cogent instructions to mothers and fathers regarding home care of the infant. One or two courses. *Staff*

PED 191. Independent Study. This rotation allows students with a particular interest in an area of pediatrics to construct their own need-specific learning experience. PED 191 is arranged with the program staff and appropriate clinical faculty. One or two courses. *Staff*

SURGERY

SUR 101. Fundamentals of Surgery. This course has been recently redesigned to better focus on the needs of P.A.'s in primary care settings. While including the basic concepts needed for P.A.'s to function well in a major surgical setting, the course emphasis is on building expertise in the areas of minor surgical techniques, emergency procedures, and the surgically related skills needed in general medicine. Included in the lecture, laboratory, and skill sessions will be a wide variety of topics

from anesthesia and asepsis to venipuncture. The students will learn first assisting, suturing, casting, various intubations, and will be certified in Basic CPR. The final eight weeks of the course will emphasize work in the Animal Surgery Laboratory. One course. *Hendrix and staff*

SUR 150. General Surgery. A four or eight-week rotation that exposes the student to a great variety of clinical problems, crossing, at times, many so-called specialty lines. Basic surgical principles, as well as insights into many of the surgical specialties, can be learned on this service. Preoperative diagnostic principles and postoperative management are emphasized. The most attractive feature of the rotation is the great diversity of surgical problems encountered. One or two courses. *Staff*

SUR 151. Surgical Outpatient/ER. During this four-week rotation, students become familiar with the evaluation and management of surgical problems of the ambulatory patient. In the emergency room, students gain experience in the initial evaluation of potential surgical conditions, particularly abdominal pain. Students learn to perform problem specific examinations and have an opportunity to evaluate patients on return visits. One course. *Staff*

SUR 152. Intensive Care. During this experience the student learns to: recognize patients requiring intensive medical care; operate and maintain life-monitoring equipment; understand and evaluate fluid electrolyte replacement and acid-base balance; and administer cardiopulmonary resuscitation and ventilatory assistance. This experience may be gained on the respiratory care unit, medical care unit, intensive care nursery, surgical acute care unit, and in pulmonary function-inhalation therapy. One or two courses. *Staff*

SUR 153. Cardiothoracic Surgery. During this rotation, the student learns to perform a detailed history and physical examination with special emphasis on the cardiothoracic system. With special help from the resident and senior staff and through reading, the student should be able to appreciate special diagnostic procedures such as angiograms, pulmonary function studies, etc. In the operating room, the student will assist and follow the conduct of various open-heart and other major thoracic procedures. The resident, senior staff, and student will participate in the management of complex problems such as various arrhythmias, shock, fluid and electrolyte imbalance. One or two courses. *Cardiothoracic surgery staff*

SUR 155. Surgical Acute Care Unit. During this rotation the student is acquainted with the postoperative care of patients who have undergone surgical procedures or suffered massive and severe trauma involving multiple organ systems. Special emphasis is centered on ventilatory assistance problems, open-heart cases, neurosurgical problems, and massive trauma cases. The variety of the patients and the diversity of the problems that exist on the unit give the student a broad insight into surgical postoperative management. The student should strive for an understanding of the pathophysiology and physiology. One or two courses. *Cardiothoracic division staff*

SUR 156. Otolaryngology. During this rotation students will learn to evaluate problems related to the ear, nose, and throat. Experience will include both ambulatory and hospitalized patients. Students will gain familiarity with various diagnostic and therapeutic procedures and will have an opportunity to follow patients over a period of time. One or two courses. *Division of Otolaryngology and staff*

SUR 157. Plastic Surgery. During this course students gain familiarity with patients requiring plastic repair including burn patients, and patients with facial anomalies and maxillofacial neoplasms. The course objectives include an understanding of preoperative and postoperative care, recording the initial history and physical examination, and ordering indicated laboratory tests and studies. It is hoped that

the student will learn to respond sensitively to the emotional needs of this group of patients. One or two courses. *Division of Plastic Surgery and staff*

SUR 160. Urology. During this rotation, students learn about urologic disease. Students participate in the care of clinic and hospitalized patients with common urologic problems and take part in initial evaluations, diagnostic procedures, surgery, and acute and long-term follow-up care. One or two courses. *Division of Urology*

SUR 161. Neurosurgery. During this eight-week rotation the student is provided with a working understanding of the problems unique in the diagnosis, treatment, and management of the neurosurgical patient. The student may gain experience in the operating room by assisting with the patient, with instrumentation, and with the operative procedures. A working knowledge is gained of diagnostic techniques such as carotid arteriograms, electroencephalograms, ventriculograms, spinal taps, etc. Experience and knowledge in emergency room techniques and management of acute neurosurgical injuries (GSW, blunt head trauma, acute quadriplegia, hemiplegia, etc.) is included. One or two courses. *Division of Neurosurgery*

SUR 162. Orthopaedic Surgery. Students gain familiarity with the evaluation and management of common orthopaedic problems at the primary care level, including soft tissue injuries, fractures, arthritis, and low back pain. Students will learn the mechanism for applying different types of traction, how to apply splints and casts, and how to provide emergency care for acute trauma. One or two courses. *Orthopaedic Division*

SUR 191. Independent Study. This rotation allows students with a particular interest in an area of surgery to construct their own need-specific learning experience. SUR 191 is arranged with the program staff and appropriate clinical faculty. One or two courses. *Surgical staff*

Graduate Degree Programs



The Graduate School of Duke University awards a Master of Health Administration degree to students who complete the program in health administration and a Master of Science degree to students who complete the program in physical therapy. Both health administration and physical therapy are departments in the Graduate School and additional information, including courses of instruction, may be found in the Graduate School bulletin which is available through the Office of Admissions, Graduate School, Duke University, Durham, North Carolina 27706. Graduate programs are also integral parts of Duke University Medical Center.

Health Administration

Professors: Robert E. Taylor, Ph.D., *Acting Chairman*; E. Harvey Estes, M.D.; B. Jon Jaeger, Ph.D.; David G. Warren, J.D.

Associate Professors: David J. Falcone, Ph.D.; Louis E. Swanson, A.B.; William E. Wilkinson, Ph.D.

Assistant Professors: Anne L. Martin, Ph.D.; Donald S. Smith, M.H.A.

Associate: Douglas Henderson-James, M.H.A.

Adjunct Professors: W. Edward Hammond, Ph.D.; Robert E. Toomey, LL.D.

Adjunct Associate Professors: William L. Berry, D.B.A.; Robert G. Winfree, M.A.

Adjunct Assistant Professors: David B. Adcock, J.D.; Samuel C. Brown, M.E.A.; Arlene J. Diosegy, J.D.; William J. Donelan, M.H.A.; J. Kevin Moore, J.D.; Duncan Yaggy, Ph.D.

The Department of Health Administration offers a four-semester, two year graduate program leading to the Master of Health Administration degree, and participates in selected joint-degree programs.

The M.H.A. program prepares individuals for management careers in complex health care organizations such as multihospital systems and academic medical centers.

The curriculum is rigorous, emphasizing quantitative decision making, statistics, operations research, financial management and accounting, public policy, health law, and organizational behavior.

One class of approximately forty is admitted each year, to start in September. Admission is highly competitive, with many applications for each student enrolled. Selection is based on previous academic and professional work, Graduate Record Examination scores, recommendations, and personal interviews conducted on campus. Only applicants who show potential for demanding graduate study and leadership in the health field are selected. For further information write to the Admissions Coordinator, Department of Health Administration, Box 3018, Duke University, Durham, North Carolina 27710.

Tuition and Expenses. The 1985-86 academic year tuition for students enrolled in the health administration program is approximately \$8,800 for first-year students and

\$7,800 for second-year students. Estimated cost for the two-year program is approximately \$29,000, including tuition and living expenses. Part-time students pay one-half the academic year tuition rate.

Financial Aid. A limited number of scholarships are available. All aid is on the basis of demonstrated financial need as described in the section on student aid in the chapter, "General Information."

Physical Therapy

Professor: Robert C. Bartlett, M.A., *Chairman*

Associate Professors: Eleanor F. Branch, Ph.D., *Director of Graduate Studies*; Elia E. Villanueva, M.A.

Assistant Professors: Grace C. Horton, B.S.; Pamela W. Duncan, M.A.C.T.

Assistant Clinical Professors: Elaine M. Eckel, M.A.; Mary Ellen Riordan, M.S.

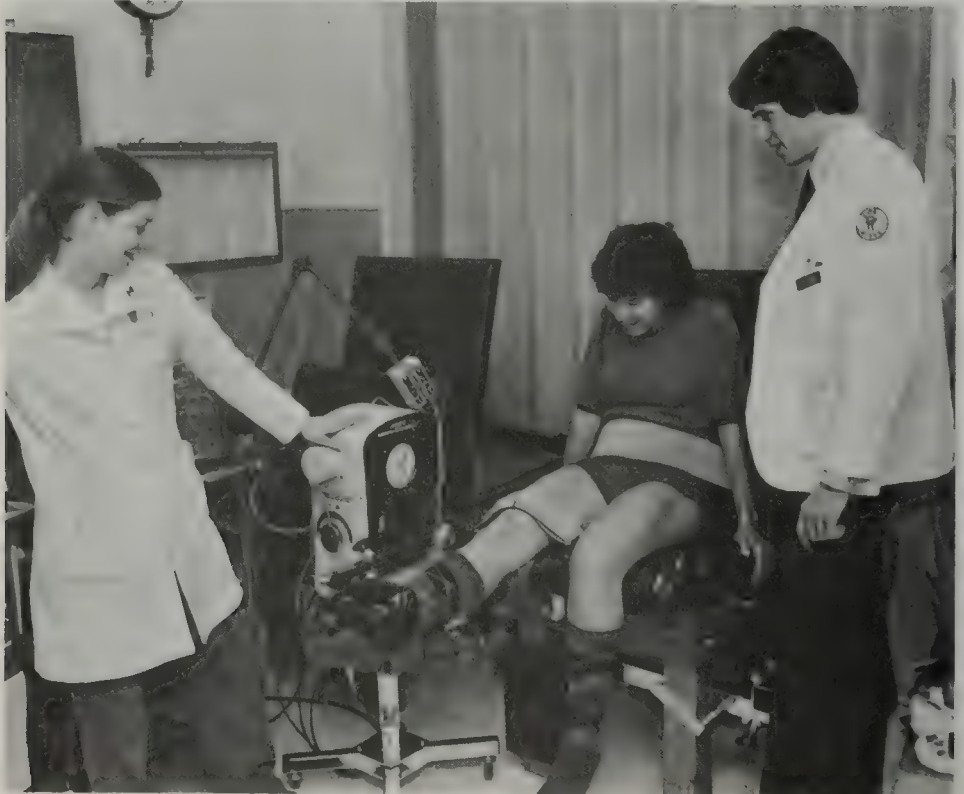
Associate: Mary M. Huse, Ph.D.

Clinical Associates: Linda M. Lawrence, B.S.; Carl J. Smith, B.S.

Adjunct Assistant Professor: Marcia Roses, M.A.

Adjunct Associates: Hazel Adkins, M.A.; Gayle B. Ashworth, B.S.; Rebecca L. Craik, Ph.D.; Susan E. Harryman, M.S.; Lois Ann Hodges, M.A.; Martha Propst, M.A.; Kathleen R. Riley, B.S.; Wadsworth D. Roy III, B.S.; Ann W. Shearer, B.S.; Ronald W. Sweitzer, M.S.; Gail W. Vanderlaan, B.S.; Elizabeth T. Warren, B.S.

The Duke University Graduate Program in Physical Therapy, leading to the Master of Science degree, is a program for entry into the profession of physical therapy. The program is designed to provide a comprehensive foundation in the art and science of physical therapy, preparing individuals for clinical practice. Experiences in the areas of administration and research are also provided. Students may arrange their curricula to allow for the development of teaching skills.



Program of Study. The fully accredited program of study requires fifty-two credit units of graduate course work, research, clinical affiliation, or other equivalent academic experience, and is twenty-two consecutive months in length. Forty-one units of work must be in physical therapy, five units in designated courses in anatomy, and the remaining six units in electives in related fields. A research project is required which provides the opportunity to pursue a particular aspect of physical therapy in depth.

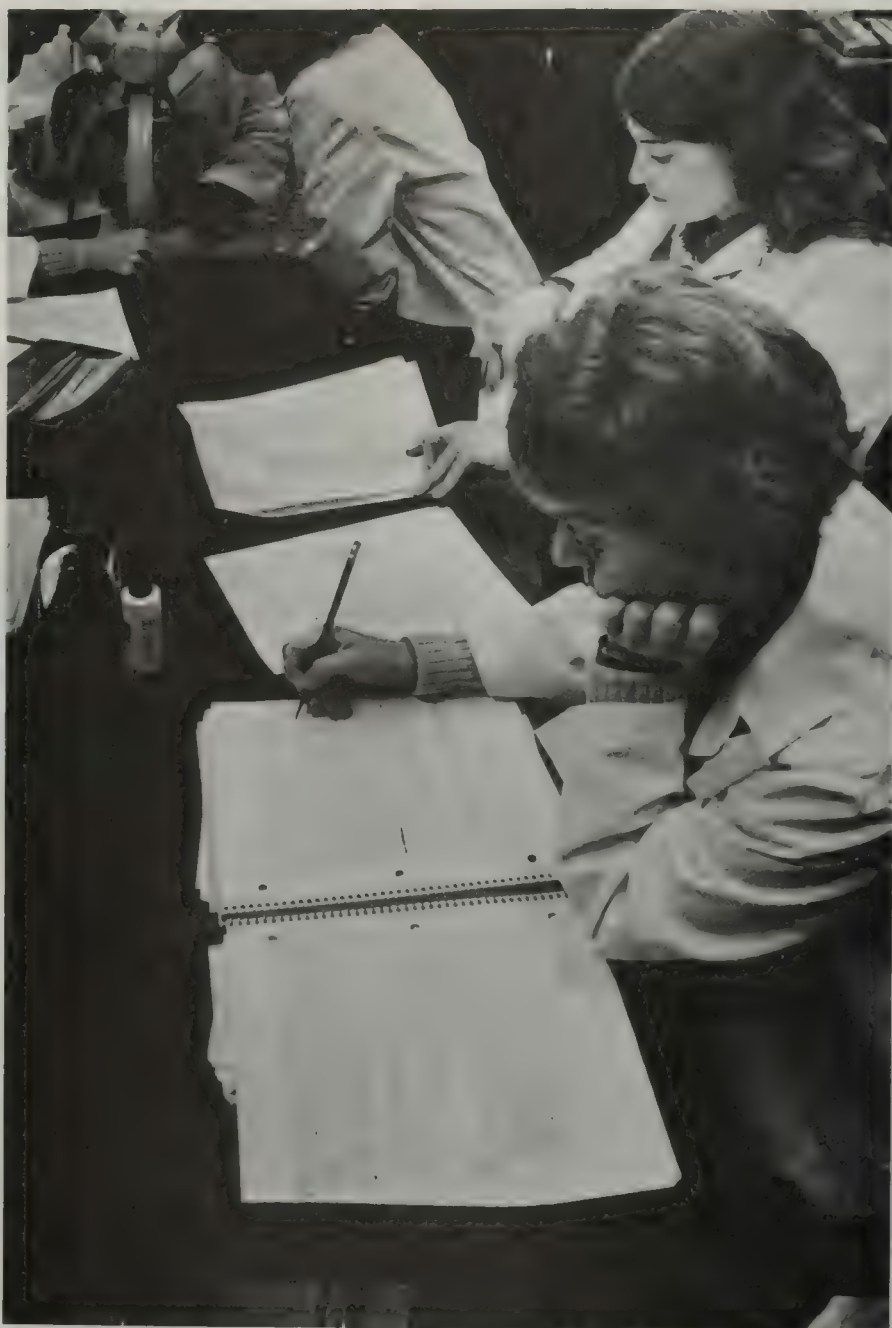
Prerequisites for Admission. Requirements for admission to the physical therapy program include a baccalaureate degree, completion of prerequisite courses, Graduate Record Examination (GRE) Aptitude Test scores, the filing of an application, and, upon invitation, a personal interview. In order to meet the closing date of 1 January for the initial receipt of an application, it is strongly recommended that the GRE be taken no later than the October test date. All supportive documents must be received by the Graduate School Office of Admissions by 1 February and only completed applications are forwarded to the Graduate Program in Physical Therapy. Only students for full-time study are accepted. State of residency does not influence admission policies or tuition costs.

Requests for applications and further information should be directed to the Director of Graduate Studies, Department of Physical Therapy, Box 3965, Duke University Medical Center, Durham, North Carolina 27710.

Tuition and Expenses. The 1985-86 academic year tuition for students enrolled in the Graduate Program in Physical Therapy is \$250 per credit unit. Estimated cost for the two-year program is approximately \$28,000, including tuition and living expenses.

Financial Aid. All students are encouraged individually to seek sources of financial assistance. Loan money may be available through the Duke University Medical Center. Financial aid applications are mailed to students after acceptance into the program. Please refer to the section on student aid in the chapter, "General Information."

Certificate Programs



Duke University Medical Center has responded to the increased need for qualified individuals at all levels in the health care system by developing educational programs designed to equip people for a variety of positions. These programs, which vary in admission requirements and length of training, offer students both clinical and didactic experience. Graduates of these programs are awarded certificates.

Clinical Psychology Internship

The Division of Medical Psychology, Department of Psychiatry, Duke University Medical Center, offers internship training in clinical psychology to students who are currently enrolled in APA-approved Ph.D. programs in clinical psychology and who have already completed three years of graduate study. The program, approved by the American Psychological Association, provides experience in many contexts with a wide diversity of patients. Internship training provides experience in the traditional activities of clinical psychologists: assessment, consultation, psychotherapy, and research. Those successfully completing the requirements for internship will be awarded a Duke University Medical Center certificate. Requests for additional information and correspondence concerning admission to the program should be directed to the Director, Clinical Psychology Internship Program, Box 3895, Duke University Medical Center, Durham, North Carolina 27710.

Cytotechnology*

Professor: William W. Johnston, M.D., *Director, Cytotechnology Program*

Associate Professor: Sandra H. Bigner, M.D.

Assistant Professor: Cheryl Szpak, M.D.

Teaching Staff: Rosiland M. Wallace, A.B., CT(ASCP), *Teaching Supervisor*; Susan P. Moore, B.A., CT(ASCP), *Instructor*

Progress in the early detection of cancer by the microscopic examination of smears of cell samplings, especially from the female genital tract, has resulted in the specialty of cytotechnology. The cytotechnologist deals with the technical and diagnostic aspects of exfoliative cytology. Graduates of the program are awarded a certificate and are eligible to take the certifying examination given by the Board of Registry of the American Society of Clinical Pathologists.

Program of Study. The twelve-month program beginning in early September consists of two parts: the first half is primarily devoted to theoretical and practical exer-

*Subject to change without prior notice.

cises in the techniques of exfoliative cytology and interpretation of the clinical material; the last half is composed of laboratory training in all aspects of exfoliative cytology.

Prerequisites for Admission. All applicants shall have completed two years (sixty semester-hours or ninety quarter-hours) of academic education in an accredited college or university before being accepted into this school. This preparatory work must include a minimum of fourteen semester-hours or twenty-one quarter-hours of biology. These may include courses in general biology, bacteriology, parasitology, physiology, anatomy, histology, embryology, zoology, and genetics. An applicant presenting a baccalaureate degree from an accredited college or university must have completed the biology requirements before admission. Biology credits earned more than seven years prior to application must be updated by taking three additional semester credits related to cell biology within a period of time not to exceed twelve months prior to admission. Priority will be given to individuals with a Bachelor of Science or Bachelor of Arts degree or to ASCP registered medical technologists.

Application Procedures. Applications must be submitted by 1 April of the year for which admission is requested and must contain the following:

1. a completed application form including a \$30 nonrefundable fee;
2. official transcripts from all colleges or professional schools attended;
3. one copy of all transcripts must be submitted by the applicant to the National Accrediting Agency for Clinical Laboratory Sciences for approval;
4. two letters of recommendation from individuals acquainted with the applicant's educational or professional experience; and
5. a personal interview prior to final acceptance.

All applicants will be notified by 1 May regarding admission to the program. Requests for further information and application forms should be directed to the Program Director, Cytotechnology Program, Department of Pathology, Duke University Medical Center, Durham, North Carolina 27710.

Fees and Expenses. On notification of acceptance, students are required to pay a nonrefundable registration fee of \$25. This fee will be applied towards the year's course fee of \$1,500. The Student Health fee is \$285 per year. Students are responsible for housing, board, uniforms, books, and insurance.

Financial Aid. See the section on student aid in the chapter, "General Information."

Electrophysiological Technology

Medical Director: Darrell V. Lewis, M.D.

Program Director: Linda Ollis, B.S., R.EEG T.

Clinical Coordinator: Linda Quinlivan, R.EEG T.

Professor: C. W. Erwin, M.D.

Associate Professor: Michael R. Volow, M.D.

Assistant Professor: J. Scott Luther, M.D.

Assistant Professor: Richard Weiner, M.D., Ph.D.

Instructional Staff: Neurology residents and laboratory staffs at Duke and the Durham VA Medical Centers and Epilepsy Centers

The Electrophysiology Technology Program is sponsored by the Division of Neurology, Department of Medicine, Duke University Medical Center. A major part of the course involves training in EEG (electroencephalography) technology. Other areas to which the student is exposed include evoked potentials, electrocardiographic technology, and electromyographic technology. Approximately ten students are accepted into the program in September. Upon successful completion of the twelve-month program, graduates are awarded a certificate and are eligible to take the certifying ex-

amination given by the American Board of Registration of Electroencephalographic Technologists.

Program of Study. The program consists of twelve months of classroom instruction and clinical training. Approximately two hours per day is spent in the classroom. The remainder of each day is spent in clinical sites at Duke University and the Durham VA Medical Center.

Prerequisites for Admission. Applicants must have a high school diploma. Applicants who had a science-oriented high school curriculum and/or some college experience will receive priority.

Application Procedures. Applications must be received by 1 June of the year for which admission is requested and must contain the following:

1. a completed application form;
2. results of the Scholastic Aptitude Test from the College Entrance Examination Board (CEEB);
3. official high school and/or college transcripts;
4. at least three letters of recommendation from individuals not related to the applicant—one from an individual acquainted with the applicant's character and the others from those acquainted with the applicant's educational or professional experience.

All applicants are notified by 15 July regarding admission to the program. Requests for further information and application forms should be directed to the Program Director, EEG Laboratory, P.O. Box 3948, Duke University Medical Center, Durham, NC 27710.

Fees and Expenses. A fee of \$1,000 is required of all students enrolled in the program. An additional nonrefundable fee of \$30 for processing the application, payable to Duke University Medical Center, must accompany the application. Students do not pay full Duke tuition. Students must furnish their own uniforms. In addition, books cost approximately \$160. The Student Health fee is \$285 per year.

Financial Aid. Please refer to the section on student aid in the chapter, "General Information."

Hospital and Clinical Pharmacy Residency

Director of Pharmacy Services: Milton W. Skolaut, B.S.

Associate Director of Pharmacy Services: James C. McAllister, M.S.

Assistant Director for Clinical Services: Christine Rudd, Pharm.D.

Coordinator for Residency Training: Richard H. Drew, B.S.

Residency Program. The Hospital and Clinical Pharmacy Residency is a twelve-month postbaccalaureate program conducted by the Department of Pharmacy at the Duke University Medical Center. The residency is designed to give the graduate pharmacist extensive training in clinical pharmacy practice and basic hospital pharmacy services including unit-dose drug distribution, large and small parenteral admixture service, total parenteral nutrition program, controlled drug systems, and hospital pharmacy administration.

Admission Standards. Applicants must be graduates of accredited schools of pharmacy and must have a B.S., M.S., or Pharm.D. degree. Resident candidates must have demonstrated good academic and leadership capabilities and be eligible for licensure in North Carolina. It is preferable that the applicant have previous hospital pharmacy experience.

Application Procedures. Applications must be submitted by 30 January of the year for which admission is requested and include the following:

1. ASHP resident matching program registration by the preceding 15 December;
2. personal interview, to be arranged by appointment;
3. official transcript from pharmacy school and other professional programs attended;
4. completed Allied Health Division application forms; and
5. letters of recommendation from at least three persons who have known the applicant professionally (i.e., pharmacy school professor, hospital pharmacist, clinical pharmacist).

Applicants will be notified by 30 March regarding admission to the program. Requests for further information and application forms should be directed to the Coordinator for Residency Training, Box 3089, Duke University Medical Center, Durham, North Carolina 27710.

Stipend. A stipend of \$15,000 is granted for the twelve-month residency.

Travel Allowance. A travel allowance of \$350 is granted for the twelve-month residency.

Medical Technology

Chairman, Department of Pathology: Robert B. Jennings, M.D., *James B. Duke Professor of Pathology*

Director of Hospital Laboratories: Kenneth A. Schneider, M.D., *Professor of Pathology*

Medical Director, Medical Technology Program: Frances K. Widmann, M.D., *Associate Professor of Pathology*

Program Director, Medical Technology Program: Margaret C. Schmidt, MT(ASCP), SH, CLS(NCA), M.A., *Associate in Pathology*

Assistant Program Director, Medical Technology, Program: Cynthia L. Wells, MT(ASCP), CLS(NCA), M.Ed.

Education Coordinators, Medical Technology Program: Kenni B. Beam, MT(ASCP), SM, CLS(NCA), M.S.; Michael L. Bishop, MT(ASCP), CLS(NCA), M.S.; Iris W. Long, MT(ASCP), SH, CLS(NCA), B.S.

Professor: John A. Koepke, M.D.

Associate Professors: Dolph Klein, Ph.D.; Thomas G. Mitchell, Ph.D.; Peter Zwadyk, Ph.D.

Assistant Professors: William H. Briner, B.S.; Jane T. Gaede, M.D.; Robert L. Habig, Ph.D.; Emily Reisner, Ph.D.; Frank Sedor, Ph.D.; Marcus B. Simpson, Jr., M.D.; John Toffaletti, Ph.D.

Associate: John A. Bittikofer, Ph.D.

Instructors: Enrique Estevez, Ph.D.; Lizzie Harrell, Ph.D.; Robert F. Wildermann, C(ASCP)M.S.

Clinical Teaching Staff: Billy, H. Abrams, MT(ASCP)B.A.; Judith P. Adams, MT(ASCP)B.S.; Marilyn Alexieff, MT(ASCP)B.A.; Lesa Banks, MT(ASCP), CLS(NCA), B.S.; Lee A. Barbieri, MT(ASCP), B.S.; Barbara Benton, M.T.; Deborah Combs-Jones, MT(ASCP)B.S.; Betty R. Crews, MT(ASCP)B.S.; Jean T. Crute, MT(ASCP)B.S.; Mary Ann Dotson, MT(ASCP)B.S.; June Gregonis, MT(ASCP)B.S.; Samuel E. Hargraves, NRCC, B.S.; Lisa A. Heath, RM(AAM), M.M.Sc.; Cathy Holleman, MT(ASCP)SC, M.S.; Kathryn Kirvan, MT(ASCP)B.S.; Freda Kohan, MT(ASCP), SM, B.S.; Ellen Lundberg, MT(ASCP)B.S.; Elizabeth Mayo, MT(AMT), B.S.; Beverly S. Oxford, MT(ASCP)SC, B.S.; Ruth Parrish, M.T.; Denise Rodio, MT(ASCP)SBB, B.S.; Suzanne Schrack, MT(ASCP)B.S.; Charles E. Stewart, MT(ASCP)B.H.S.; Patricia E. Thurrell, MT(ASCP)SBB, M.Ed.; Gail Vesilind, MT(ASCP), SBB, B.S.; Shirley Violand-Jones, MT(ASCP)SI, M.S.; Irene A. Wyatt, MT(ASCP)B.S.

Affiliate Institution Advisers: Robert K. Reid, Ph.D., *Meredith College*; Marsha E. Fanning, Ph.D., *Lenoir-Rhyne College*; George F. Jackson, Ph.D., *University of Tampa*; Stephen R. Nohlgren, Ph.D., *Salem College*; Eileen Gregory, Ph.D., *Rollins College*.

Program of Study. The educational program begins 1 June and consists of fifty-six instructional weeks plus three weeks of vacation. The first twelve weeks consist of a core curriculum of clinical pathology courses offered to all students at the same time. After successful completion of the core curriculum, the student is eligible to begin forty weeks of clinical rotations in the Medical Center laboratories. In the spring, a four-week term is devoted to a course of study in educational techniques, management and supervision, computers in laboratory medicine, and other clinical laboratory sciences. Lectures, student laboratory experience, and clinical laboratory instruction are presented by a faculty and staff of physicians, chemists, microbiologists, and medical technologists.

Graduates of this CAHEA-approved program are eligible for national certification as a medical technologist. Career opportunities in hospital laboratories, research, public health facilities, and educational institutions are widely available. This program is formally affiliated with Meredith College, Raleigh, North Carolina; Lenoir-Rhyne College, Hickory, North Carolina; and the University of Tampa, Tampa, Florida; and Salem College, Winston-Salem, North Carolina, to provide the 3+1 study format toward a degree from these institutions. A cooperative agreement exists with Rollins College, Winter Park, Florida, to channel 4+1 Rollins students to this program.

Prerequisites for Admission. Applicants to the program must possess the following academic prerequisites:

1. Possession of a baccalaureate degree, OR the completion of at least three years of study in an accredited college or university which totals ninety semester hours (120 quarter hours) with grades of C or better, and the written guarantee that a baccalaureate degree will be conferred by a university after successful completion of this program.
2. Sixteen semester hours (twenty-four quarter hours) of chemistry (including at least one course in organic chemistry). Quantitative analysis may be accepted in lieu of the second semester of organic chemistry.
3. Sixteen semester hours (twenty-four quarter hours) of biology (including one course in microbiology).
4. One course of college level mathematics.

Application Procedures. A completed application file contains the following:

1. The completed Duke University Medical Center Allied Health application form, including a nonrefundable processing fee;
2. Official transcript(s) from all colleges and universities attended;
3. Three letters of recommendation, one from a professor of biological sciences, one from a professor of chemistry, and one from a college adviser;
4. A personal interview with members of the Admissions Committee, if requested, following the receipt of the application and other information;
5. A written statement of interest in medical technology;
6. A NAACLS transcript evaluation, if requested.

The deadline for applications is 1 April of the year for which admission is requested. It is strongly recommended that applications be submitted by 15 February to receive timely consideration. Applications received after 15 February will be considered on a space-available basis. Applicants will be notified no later than 1 May regarding admission to the program. Requests for further information and application forms should be directed to the Medical Technology Program, Box 2929, Department of Hospital Laboratories, Duke University Medical Center, Durham, North Carolina 27710.

Fees and Expenses. Tuition for the program is \$2,200.* A minimal lab fee is charged for the core curriculum. The student is responsible for housing, board, uniforms, books, and student health fee and medical insurance.

A nonrefundable deposit of \$175 is required of all accepted candidates to hold their place in the class. This deposit applies toward the tuition fee. The remaining tuition and fee balance is billed in two increments; at matriculation and in January (mid-year).

Transportation Required. The use of facilities other than Duke and Durham Veterans Administration Medical Centers requires transportation. It is the responsibility

*Subject to change without prior notice.

of each medical technology student to provide a means of transportation to and from the facilities selected for learning experiences. Although a few sites may be within bicycling distance, most are not.

Financial Aid. Please refer to the section on student aid in the chapter, "General Information." All candidates are urged to seek independent sources of financial assistance.

Courses of Instruction. Students must complete the following courses:

Core Curriculum*

<i>Clock Hours</i>	<i>Course Title</i>	<i>Lect/Lab</i>
MT 103	Introduction to Clinical Laboratory Sciences	25/8
MT 112A	Fundamental Principles of Instrumentation	40/40
MT 120	Immunohematology	42/24
MT 121A	Fundamental Principles of Blood and Body Fluids	36/54
MT 123	Principles of Immunology	22/00
MT 132	Medical Microbiology/Serology	37/34

*Course work in the core curriculum must be successfully completed to gain access to clinical rotation courses which follow.

Clinical Rotations and Courses

	<i>Course Title</i>	<i>Lecture Clock Hours</i>	<i>Total Rot. Weeks</i>
MT 151	Clinical Microbiology/Serology	—	10
MT 153	Clinical Immunology-Immunohematology	—	10
MT 155	Clinical Blood and Body Fluids	—	10
MT 157	Clinical Chemistry	—	10
MT 107	Human Pathology	27	—
MT 112B	Biochemistry of Disease	30	—
MT 113	Quality Assurance in Health Care	20	—
MT 114	Clinical Laboratory Futures	36	—
MT 121B	Pathology of Blood and Body Fluids	30	—
	<i>Spring Term</i>		<i>Lect/Lab</i>
<i>Clock Hours</i>			
MT 110	Medical Applications of Computers		12/00
MT 122	Parasitology		8/16
MT 124	Educational Techniques for the Health Professional		20/00
MT 126	Laboratory Supervision and Management		24/00

Pastoral Care and Counseling

Associate in Instruction: Peter G. Keese, S.T.B., Th.M., *Director of Clinical Pastoral Education Programs*
 Associates in Instruction: P. Wesley Aitken, B.D., Th.M.; David M. Franzen, B.D., Th.M.
 Professor: Richard A. Goodling, B.D., Ph.D.
 Associate Professor: Paul A. Mickey, B.D., Ph.D.

A graduate program in pastoral care and counseling is available to clergy and sympathetic laity of all religious groups. There are four program options: a single unit of clinical pastoral education, an internship, a residency, and a fellowship. All are designed to train ordained individuals who desire to specialize in pastoral care and counseling, enhance their skills as parish clergy, or to broaden their understanding. Those who enroll in the program will be required to serve as chaplains or as pastoral counselors in the Medical Center or in the community of Durham. All program options are approved by the Association for Clinical Pastoral Education, Inc.

Programs of Study. The following programs in basic, advanced, and supervisory clinical pastoral education are offered at the Duke University Medical Center:

Single Unit of Basic CPE. The single unit is offered during the summer months, beginning in June and lasting ten to twelve weeks (dates to be specified). It is also offered on a part-time basis concurrently with the fall and spring semesters of Duke Divinity School (the fall/spring extended unit). Admission to the single unit of basic CPE is based on the following:

1. submission of written application materials;
2. admission interview by a qualified examiner;
3. acceptance by the center.

*Clinical Internship (Basic CPE).** The internship usually begins in June and lasts for twelve months (dates to be specified). This program grants four units of CPE credit with the ACPE. Admission is based on the following:

1. graduation from college—equivalence may be considered;
2. evidence of serious religious and theological interest;
3. completion and supervisor's evaluation of one certified unit of CPE (basic unit) in an accredited center usually strengthens the application;
4. submission of written application materials;
5. a personal interview with the supervisory and teaching staff;
6. acceptance by the center.

*Clinical Residency (Advanced CPE).** The residency usually begins in September and lasts twelve months. The specialization of the advanced year may be in a number of clinical settings including pastoral counseling and hospital chaplaincy. Four units of CPE credit are granted with the ACPE. Admission is based on the following:

1. adequate ministry formation/development and experience in ministry which indicates readiness for Advanced CPE;
2. submission of written application materials;
3. a personal interview with the supervisory and teaching staff;
4. acceptance by the center.

*A Fellowship in Supervisory CPE.** Supervisory CPE provides a learning opportunity for the qualified person, with demonstrated personal, professional, and clinical competence who desires to become a certified supervisor of CPE. Admission to this program is based on his/her potential to assist others in the clinical methods of learning, together with a capacity to acquire techniques and theories of supervision. Admission to supervisory CPE is based on:

1. ecclesiastical endorsement;
2. a period of time which allows the candidate to demonstrate his/her ability to function pastorally, usually not less than three years;
3. completion of program objectives of basic and advanced CPE, usually at least four units of CPE;
4. consultation by the appropriate committee in the region with respect to his/her readiness to pursue supervisory training;
5. submission of written application materials;
6. a personal interview with the supervisory and teaching staff;
7. acceptance by the center.

Beginning and ending dates vary according to the needs of the trainee and the program.

*Students who are taking more than two courses (not including CPE) in the Divinity School for academic credit will receive only three certified units of CPE—one in the summer, one in the fall, and one in the spring. All others receive four units of certified CPE. Beginning and ending dates vary according to the needs of the trainee and the program.

Requests for application and further information about any of the programs should be directed to the Director, Clinical Pastoral Education Programs, Box 3112, Duke University Medical Center, Durham, North Carolina 27710.

Fees and Expenses. A fee is usually charged for the screening (admission) interview. In our region of the ACPE, Mid-Atlantic, the fee is \$35. The fee varies from place to place throughout the nation. All students who take clinical pastoral education at Duke Medical Center must be accepted and enrolled through either the Duke University School of Medicine or Duke Divinity School.

Students who wish to receive academic credit shown on a transcript should apply for admission to Duke Divinity School as a degree candidate (M. Div. or Th.M.) or as a special student. They will then enroll for CPE through Duke Divinity School and will pay fees to the Divinity School according to Divinity School charges. Residents in pastoral counseling are required to be enrolled through the Divinity School for one semester.

All other students must be enrolled through the Duke University School of Medicine, whether for single units or year-long programs. For 1985-86 fees are \$235 per unit. The Student Health fee is \$285 per year.

Financial Aid. A limited number of training stipends is available for the internship, residency, and fellowship. No stipends are available for the single unit of training.

Physician Assistant

A limited number of students who are not eligible for admission to the Bachelor of Health Science degree program, but who possess outstanding credentials in a health care field, are accepted into the certificate program. The two-year program, including tuition, is the same as that described previously. Students are issued a Duke University undergraduate identification card and are granted the same privileges as the physician assistant students in the Bachelor of Health Science degree program. Prerequisites for admission differ in that applicants not planning to receive the degree need not complete sixty semester hours of college level courses. Also, these applicants must submit their high school transcript(s); transcripts from diploma nursing or other health professional schools and military training programs; must complete by 15 January a college level course in both general chemistry and general biology; and must complete, also by 15 January, two years of health care experience.

Prosthetic/Orthotic Technology

Professor and Medical Adviser: Frank W. Clippinger, M.D.

Professor: Frank H. Bassett III, M.D.

Course Director and Director, Department of Prosthetics and Orthotics

Clinical Coordinator: C. Ross Tingen, C.P.

Instructors: C. Ross Tingen, C.P.; Percy H. Ray, C.O.; Felton L. Elliott, C.O.; William E. Harris, C.O.

Clinical Assistant Instructors: Dan Ellis, R.T.P.; Carson Perry, R.T.O.; Louis Whitfield, R.T.O.

Prosthetic/Orthotic Technology Certificate Program. Students are admitted each September for a two-year Orthotic or Prosthetic Technology Certificate Program. Each student receives both academic and clinical training in all aspects of the field. After successful completion of the program, the student is eligible to take the National Technician Registry Examination administered by the American Board for Certification in Orthotics and Prosthetics, Inc.

Program of Study. The program follows the guidelines established by the American Board for Certification in Prosthetics and Orthotics, Inc., under clinical affiliation and training. The number of hours devoted to all subjects generally exceeds their basic minimal requirements. Class lectures are scheduled weekly during the year. The re-

mainder of the program involves a series of clinical and technical rotations in all aspects of technological activity under the supervision of full-time certified or registered orthotic/prosthetic practitioners and/or technicians, senior staff orthopaedic surgeons, and orthopaedic residents. Periodic examinations are given to evaluate progress, with the seventy-fifth percentile constituting a passing grade.

Full time attendance is mandatory in both classroom and practical work, maximum unscheduled hours of absence for the calendar year is forty (40). Beginning second semester, periodic rotations on Saturday, Sunday, and selected week nights may be required.

Prerequisites for Admission. All applicants must have a diploma from an accredited high school or its equivalent.

Application Procedures. The following are necessary to complete the application procedures:

1. A completed application form including a recent photograph and a nonrefundable fee of \$30;
2. Official transcripts from all high schools, colleges or professional schools attended;
3. Three letters of recommendation from persons not related to the applicant;
4. A personal interview.

Request for further information and application forms should be directed to the Course Director, Orthotic/Prosthetic Technology Program, Box 3885, Duke University Medical Center, Durham, North Carolina 27710.

Fees and Expenses. A course fee of \$1,000 per year is charged. In addition, books, personal safety items, and supplies will cost approximately \$850 per year. The Student Health fee is \$285 per year.

Financial Aid. The program is approved for the enrollment of persons eligible for benefits under Title 38 USC(G.I. Bill). Please refer to the section on student aid in the chapter, "General Information."

Specialist in Blood Bank Technology

Chairman, Department of Pathology: Robert B. Jennings, M.D., *Professor of Pathology*

Director of Hospital Laboratories: Kenneth A. Schneider, M.D., *Professor of Pathology*

Medical Directors, Specialist in Blood Bank Program: John A. Koepke, M.D., *Professor of Pathology*;

Marcus B. Simpson, M.D., *Assistant Professor of Pathology*

Program Director, Specialist in Blood Bank Program: Tricia Thurrell, M.Ed., MT(ASCP) SBB

Education Coordinator: Denise Y. Rodio, MT(ASCP) SBB

Program Instructors: Tabbie Bolk, MT(ASCP) SBB; Gail Vesilind, MT(ASCP) SBB

Professor: Wendell K. Rosse, M.D.

Associate Professor: Frances K. Widmann, M.D.

Assistant Professor: Emily G. Reisner, Ph.D.

Associate: Margaret C. Schmidt, M.A., MT(ASCP) SH, CLS(NCA)

Instructors: Cynthia L. Wells, M.Ed., MT(ASCP), CLS(NCA); Robert F. Wildermann, M.A., C(ASCP)

Triangle Center Red Cross Instructors: Donald Bennett, MT(ASCP); Ann Califf, MT(ASCP) SBB; Lesa Banks MT(ASCP), SSB

The Transfusion Service in the Department of Hospital Laboratories of the Duke University Medical Center offers a twelve-month program in advanced blood bank technology. This program is accredited by the American Association for Blood Banks and the American Medical Association's Committee on Allied Health Education and Accreditation (CAHEA). It is designed to give experience in administration, supervision, teaching, technical consultation, and research. Upon satisfactory completion of the course work, the student is awarded a certificate and is eligible for national certification as a Specialist in Blood Bank Technology. Career opportunities in hospital

blood banks and transfusion services, independent blood centers, research and development laboratories, sales and marketing positions, and educational institutions are widely available.

Program of Study. The educational program begins on the last Monday of January and consists of fifty-four instructional weeks including two weeks of vacation. The first week is an orientation period which leads into the clinical rotations at the Medical Center and at the Triangle Center Red Cross. Each Wednesday is devoted to didactic coursework, discussion groups, and counseling sessions. Instruction is provided by the faculty and staff of the Medical Center.

Prerequisites for Admission. Applicants to this program shall possess a baccalaureate degree which includes sixteen (16) semester hours (or the equivalent) of biology; sixteen (16) semester hours (or the equivalent) of chemistry, including one semester of organic chemistry; and one course in college mathematics or computer science. The equivalent of two years of full-time work experience is required before matriculation into the program. It is desirable that some of the work experience be in hospital blood banking. If the applicant is certified by a recognized certification agency as a medical technologist, the work experience required may be shortened by the length of time spent in the clinical rotations in the structured educational program. The directors of the program will rule on the acceptability of the work experience.

Application Procedures. Applications should be submitted by 1 August, and must contain the following:

1. A completed Duke University Medical Center Allied Health application form, including a nonrefundable processing fee;
2. Two copies of the American Association of Blood Banks Educational Program for Specialist in Blood Bank Technology application form;
3. A notarized copy of the certificate from the certifying agency OR official transcripts from all colleges and universities attended;
4. Three letters of recommendation, one from a present employer (or immediate past employer if not currently working), and two from the following: education coordinator of the laboratory education program, laboratory supervisor, college adviser, or college professor in the natural sciences.
5. A written statement of interest in further education in blood banking and this program;
6. A personal interview with members of the Admissions Committee, if requested, following the receipt of the application forms and other requested information.

Requests for information and application forms should be directed to the Education Coordinator, Specialist in Blood Bank Program, Box 2928, Duke University Medical Center, Durham, North Carolina 27710.

Fees and Expenses. Tuition for the program is \$2,000,* payable in two installments, at matriculation and in September. The Student Health fee is \$285 per year. Each SBB student is considered a part-time employee of the Transfusion Service and can expect to earn approximately \$8,000 during the year. This could be supplemented by additional weekend work if so desired. The student is responsible for housing, board, books, student health fee, and insurance.

Financial Aid. Please refer to the section on student aid in the chapter "General Information."

*Subject to change without prior notice.

Courses of Instruction. Students must complete the following courses and clinical rotations:

<i>Course Title</i>		<i>Contact Hours</i>
SBB 101A	Immunology	15
SBB 101B	Genetics	14
SBB 102A	Coagulation, Component Therapy	23
SBB 102B	Hematology	11
SBB 103	Human Blood Groups	33
SBB 104	Special Topics in Blood Banking	37
SBB 105	Quality Assurance	9
SBB 106	Educational Techniques	18
SBB 107	Management/Supervision	18
SBB 108	Seminars in Transfusion Medicine	50
SBB 109	Clinical Laboratory Rounds	195
<i>Clinical Rotations</i>		<i>Weeks</i>
SBB 110	Transfusion Service/Compatibility Laboratory	16
SBB 111	AABB Accredited Immunohematology Reference Laboratory	16
SBB 112	Coagulation	1
SBB 113	HLA Laboratory	2
SBB 114	Triangle Center Red Cross	10
SBB 115	Research	5

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bulletin of

Duke University 1985-86

The School of Law



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Duke University 1985-86

The School of Law

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Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, contact Dolores L. Burke, Equal Opportunity Officer (919-684-8111).

The information in this bulletin applies to the academic year 1985-86 and is accurate and current, to the extent possible, as of June 1985. The University reserves the right to change programs of study, academic requirements, teaching staff, the calendar, and other matters described herein without prior notice, in accordance with established procedures.

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Calendar of the School of Law 1985-86

Summer Session

1985

June	
3	Monday, Registration for entering students
8	Saturday, Orientation for summer entrants
10	Monday, First day of class
July	
4	Thursday, Holiday
August	
12	Monday, Last day of class
14-16	Final examinations

Fall Semester

1985

August	
21	Wednesday, Registration for returning students, first-year orientation
22	Thursday, First day of class
October	
21-25	Recess for reading, writing, and placement travel
November	
25-27	Recess for reading and writing for first-year students
28-29	Thanksgiving recess
December	
6	Friday, Last day of class for upperclassmen
7-23	Reading and examinations for upperclassmen
11	Wednesday, Last day of class for first-year students
16-21	First-year examinations

Spring Semester

1986

January	
6	Monday, First day of class. For first-year students, only the course in Lawyers and Clients meets.
13	Monday, First day of class for regular first-year courses
March	
3-7	Recess for reading, writing, and placement travel
April	
16	Wednesday, Last day of class for upperclassmen*
17	Thursday, Reading and examination period begins
18	Friday, First-year courses end
May	
2	Friday, Examination period ends
4	Sunday, Commencement

*Rotating make-up classes will be scheduled for Thursday and Friday, April 17 and 18.

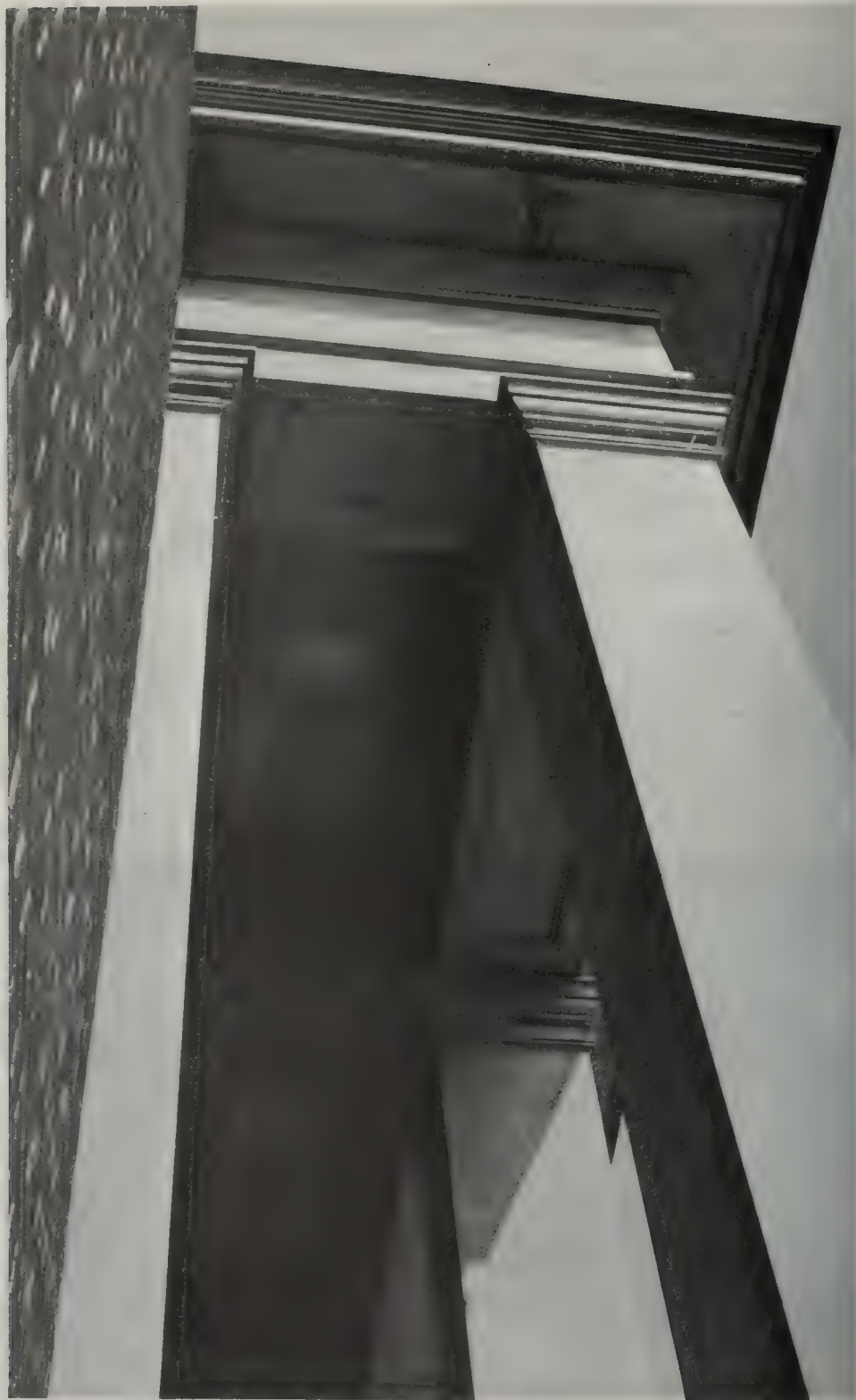
University Administration

- H. Keith H. Brodie, M.D., *President*
- Phillip A. Griffiths, Ph.D., *Provost*
- William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
- Eugene J. McDonald, LL.M., *Senior Vice-President*
- William J. Griffith, A.B., *Vice-President for Student Affairs*
- John J. Piva, Jr., B.A., *Vice-President for Development and Alumni Affairs*
- William L. Green, Jr., A.B., *Vice-President for University Relations*
- Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
- J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
- Roger L. Marshall, A.B., *Secretary of the University*
- Andrew G. Wallace, M.D., *Vice-President for Health Affairs*
- Joel Fleishman, LL.M., *Vice-Chancellor*
- Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
- R. James Henderson, M.Ed., *Associate Vice-President and Business Manager*

Law School Administration

- Paul D. Carrington, *Dean*
- Jean Taylor Adams, *Associate Dean*
- Benjamin R. Foster, *Assistant Dean for Research Administration*
- Gwynn T. Swinson, *Assistant Dean for Student Affairs and Admissions*
- Evelyn M. Pursley, *Assistant Dean for Alumni and Development*
- Richard A. Danner, *Director of the Law Library*
- Mary A. Monroe, *Senior Administrative Assistant to the Dean*
- Margaret Cates, *Coordinator for Development*
- Cynthia Peters, *Assistant Director of Placement*
- Charanne Clarke, *Supervisor of Secretarial Services*
- Denise Coleman, *Staff Assistant, Admissions*
- Janse Conover, *Staff Assistant to the Dean*
- Patricia Delaney, *Staff Assistant, Admissions*
- Rebecca Fisher, *Staff Assistant for Research Administration*
- Mary Jane Flowers, *Staff Assistant for Publications*
- Linda Harris, *Staff Assistant, Alumni and Development*
- Mary Hawkins, *Financial Aid Assistant*
- Lundy Johnson, *Senior Recorder*
- Sarah Roberts, *Staff Assistant to the Director of the Library*

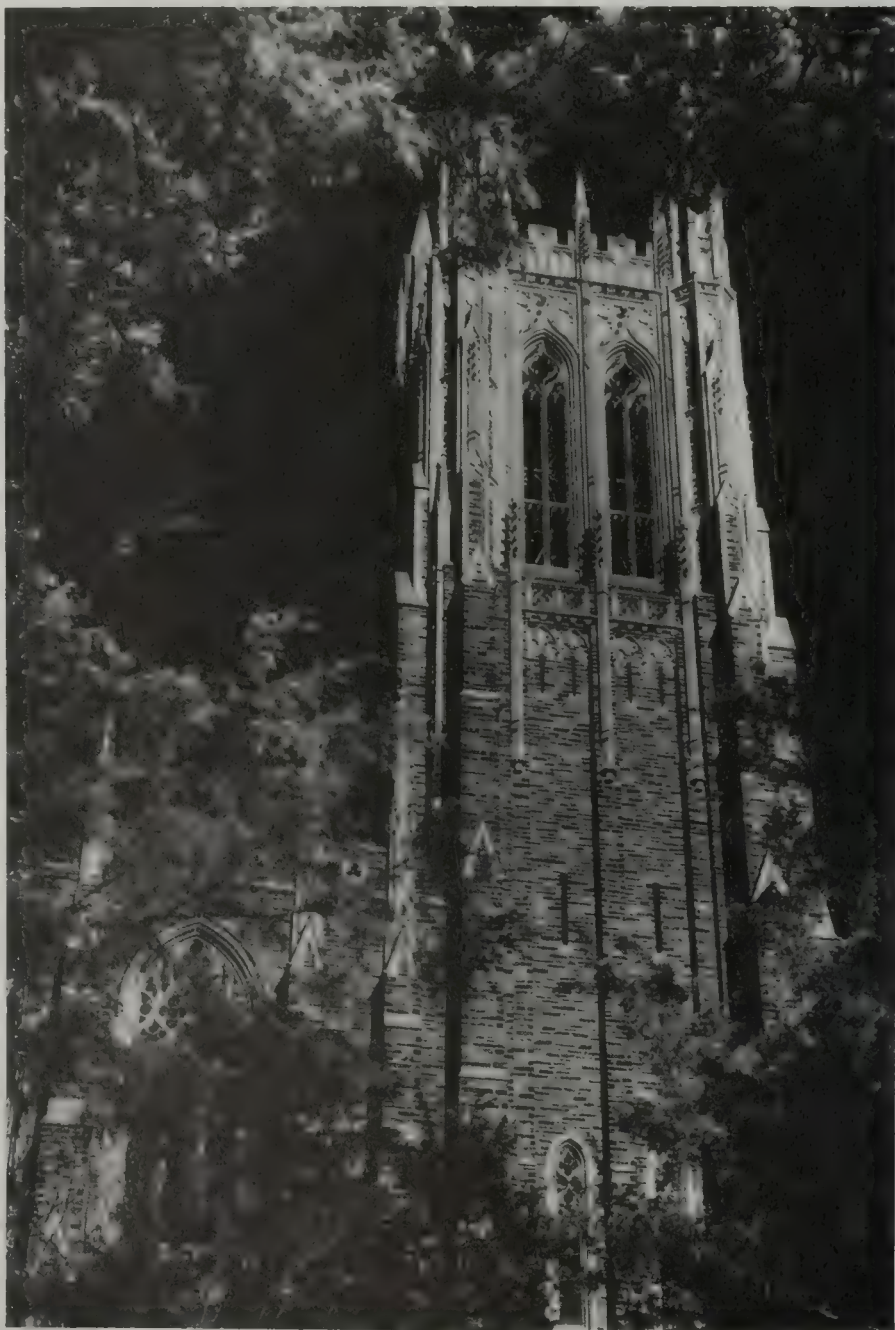




Altruism combined with realism; knowledge of fundamental principles and capacity to apply them; courage to insist on the right and patience to achieve it; understanding of the timidity of the weak; fearlessness of the domination of the powerful; sympathy for the mistakes of the indiscreet; caution of the craftiness of the unprincipled; enthusiasm for that which is fine and inspiring; reverence for that which is sacred; these are some of the attributes of great lawyers.

Justin Miller
Dean, 1930-34
Duke University School of Law

The Distinction of Duke



Mastering the Law

The business of the Law School is to provide a place where professors and students may join in the effort to explore and to master the discipline of law.

Many students come to law study with a limited perception of what they are about. Some suppose that law is a body of rules and that lawyers are people who know the rules. This is not wrong, but it is misleadingly incomplete. Legal rules are countless; many are subject to frequent change; they conflict; and their words often conceal more meaning than they reveal. Lawyers are people who understand and influence the ways in which elusive rules work in the minds of officials who must enforce them. Their discipline is thus more than a mass of data to be assimilated. It is an activity; and its mastery requires judgment and gift of expression as well as information.

Mastery of this discipline is rarely to be achieved by passive learning. True, much lonely effort is required. But full development requires substantial interaction with others. For most learners of law, the best school is the one that affords the best opportunity and inducement to participate in a prolonged conversation about the law with persons of wit, industry, and experience. The more intense the dialogue, the stronger is the mastery of the discipline.

One who seeks such interaction might wisely examine four qualities of a law school: the students, the faculty, the intellectual environment, and the program.

The Duke Law Students

Each year, about 170 first-year law students are enrolled at Duke; the aim is to maintain a student body of 500. Duke students are among the most rigorously selected in the United States; not more than four or five schools are able to maintain minimum academic admission standards that are higher than Duke's. Most entering students will present undergraduate academic records in the range of A minus or higher, and most will have scored in the low forties on the standardized test or higher.

Equally important, most Duke students bring other qualifications that assure their ability to contribute to the enterprise of mutual learning. About twenty-five members of a recent typical class are over twenty-five years of age. Many of these persons have recorded significant achievements in some activity outside the law. Others have attained graduate degrees in other disciplines. More have achieved particular distinction as undergraduates. Thus, there are accomplished writers, experienced performing artists, outstanding athletes, and others of unusual achievement.

Duke law students are unusually diverse in their backgrounds. The geographic distribution may be the broadest of any American law school. The number of under-

graduate institutions represented in the student body is almost certainly the largest in proportion to size. As must be the case with such institutions, the great bulk of the students are from middle-class suburban families. But a few are from rural communities. Some are from inner-city neighborhoods. And the ethnic diversity is substantial. Recent classes have included a number of international students, including at least one or more students from the People's Republic of China, whose government has established a special relationship with Duke. Duke, unlike most comparable schools, integrates its international graduate students, who are foreign lawyers, with the regular J.D. program, so that all its students have ample opportunity to establish relations with fellow students from around the world.

Diversity has been achieved with no substantial compromise on academic or intellectual qualifications. There is not and never has been a quota of any kind at Duke, but there is a continuing effort to achieve racial diversity in the mix of the student body. No one has been admitted to Duke who was regarded as a serious academic risk. The quality of Duke's minority students is attested to by the fact that in one recent class, four of twelve members achieved election on merit to the honorific *Duke Law Journal*.

The Duke Law Faculty

There are presently thirty-nine persons holding professorial appointments in law at Duke; all but eight of these hold academic tenure. Seven of those holding tenure have primary appointments in disciplines other than law. They were selected after extensive search for the persons with the greatest capacity for legal discourse. Those holding tenure are persons who have proven themselves as excellent scholars who maintain positions of prominence in their fields. They are also expected to maintain excellence in the classroom. The full-time faculty are not expected to practice law; while minor consulting efforts are an appropriate method for maintaining contact with the profession, the professors are committed to scholarship, teaching, and public service. Most of the faculty have had substantial experience as lawyers, and not infrequently leaves are granted for the purpose of performing professional work elsewhere. Each year, several of the faculty are absent to engage in research, to teach elsewhere, to serve government, or to assist in the administration of the University. But their places are filled with visiting faculty, and the visitors are often persons of unusual stature.

The professorial faculty is assisted in the presentation of the law curriculum by a number of persons who have limited or qualified commitments to the law school program. The faculty includes senior lecturers, lecturers, fellows, and instructors in legal research. These persons are selected on the basis of the special contribution that each is able to make to the teaching program. They are selected from year to year in light of the needs of Duke students for particular kinds of instruction. A number of the adjunct faculty are legal practitioners; several are members of the judiciary; a few are scholars in law-related disciplines.

The Duke Environment

The Law School is part of a university of relatively recent origin. Founded in 1924 with a single giant benefaction to a small college, Duke promptly took a place among the newly prominent American universities. Most of its schools and departments are recognized as superior. The School of Medicine and its hospital are particularly noted. All of the University's endeavors are conducted on a moderate scale with respect to the numbers of students served. About nine thousand students are enrolled in the University.

The relatively small size of the Law School is an important attribute. There is very little anonymity at Duke. Students are close to the faculty and to one another. The

resulting sense of community tends to ease competitive pressure. Law students everywhere are an aggressive lot, and some elite law schools can be infected with a spirit of destructive competition. This can seriously obstruct the process of mutual instruction, and can even cause passivity and alienation among many students. Inertia in the midst of frenzy is the unfortunate syndrome. The phenomenon occurs less frequently in an institution that is conducted on a smaller, human scale, where friendships are more easily maintained. At such a school, it is more likely that competition amongst students will be stimulating and benign.

The sense of community within the Law School at Duke is enlarged by the fact that few of the students are involved with competing interests or relations in the area. Only one in nine of the students is a North Carolinian. Less than one in ten has previously attended Duke University. Relatively few are employed outside the University during the academic year. Most live, during the academic year, within a few minutes of the school. Thus, although the Law School does not maintain a residential facility for law students, there is at all times a substantial group of students working and talking in the building. The law building is not dramatic, but is designed to accommodate a fairly intimate and sociable learning habit.

The city in which Duke is located is a nineteenth-century tobacco mill town, the home of Bull Durham, Chesterfields, and Lucky Strikes. It is also now the location of a particularly prosperous black business community that includes the headquarters of a large insurance company. And it is part of a metropolitan area that includes Raleigh, the state capital, and Chapel Hill, the location of the University of North Carolina's main campus.

This metropolitan area does provide ample opportunity for recreation, but the attractions are not so numerous as to be a major source of distraction. It is no longer remote; there are frequent short flights to Washington. And its cultural isolation, a remnant of southern history, is rapidly diminishing. The center of the metropolitan area is now the Research Triangle Park, where over thirty substantial research laboratories are located, and where over twelve thousand scientists and engineers are employed. The high concentration of professional and scientific workers in the area has brought significant change. A symphony orchestra of quality is supported. In 1978, the American Dance Festival relocated in Durham. In 1982, the University opened a new student center which provides excellent accommodations for orchestral, ballet, and theatrical performances, and for films. This center is a few hundred yards from the Law School. In 1984, the Law School Performing Arts Council inaugurated a series of concerts held in the Law School, some performed by talented law students and faculty.

The Duke Program

The curriculum is distinctive in the degree to which students are drawn into formal dialogue with the faculty and with one another.

The most distinctive features are presented in the first year. Duke, unlike most schools serving similar students, invests a proportionate share of its teaching resources to instruction of first-year students. Students are generally assigned to take one beginning course in a class of not more than twenty-five students; in these classes, a heavy emphasis is placed on student participation. Every member of the class is expected to participate in the discussion frequently.

In addition, all first-year students are assigned to a tutorial program in legal writing and advocacy. Each member of the class is required to do a substantial amount of writing under faculty supervision. Student work is criticized and often rewritten until a high standard of quality is achieved. The experience provided is not unlike that which is afforded at many schools only to those students who are elected to law reviews, where the students vigorously edit the work of one another.



The intended effect of these features of the first-year program is to involve students more deeply with one another and with the faculty in a shared intellectual enterprise. This effort is continued through the upperclass years in the seminar offerings.

Another unusual feature of the first year is the intensive one-week course, *Lawyers and Clients*, which explores the law governing professional relationships. Part of the instruction in this course is given by persons of substantial professional experience.

Since 1983, part of the entering law class has been admitted for a special program beginning about the first of June. These students begin the study of law in the summer, leaving time in the first year also to commence graduate level study of economics, history, philosophy, political science, public policy science, sociology, or the study of the humanities. At the end of the first year these students will have completed all of the work required of first-year law students, and will also have made a solid start on an advanced degree in a second discipline. The purpose of this program is to reinforce the interest of the participating students in law as an academic discipline that is linked to others. Students can complete the J.D. and M.A. degrees in three academic years plus the entering summer. This program is still experimental; it is a joint venture of the Law School and the Graduate School. As an alternative open to summer-entering students, the Law School also offers its own joint-degree program for students wishing to pursue a second degree in law: the Master of Laws (foreign and international law). This degree can also be completed in the period of resident study of three years plus the entering summer. The school also maintains a substantial clinical program through a number of the advanced seminars that are presented by the clinical method. Students are placed in professional roles and asked to perform the intellectual endeavors of lawyers. Their performances are criticized, often by practitioners who are actively engaged in the professional activity involved. Many of these clinical seminars require substantial writing. One, the seminar on trial practice, is largely forensic and involves heavy use of videotape to review and criticize student presentations. Also offered to upperclass students is an unusual clinical course in commercial practice which brings students under the supervision of lawyers practicing in major private firms.

Other seminars are directed at more purely theoretical topics. But these, too, are conducted in small groups of twenty-five or less, and generally require substantial writing. These offerings also serve to bring students into closer contact with one another and with the faculty in the common pursuit. Another distinctive feature of the upperclass curriculum is the Research Tutorial, which brings together a small group of students and faculty for the purpose of a joint venture in scholarship leading to publication.

Upperclass students are encouraged to blend formal instruction with these less formal, more personal contacts with the faculty. They are also encouraged to invest substantial academic effort in other programs having less faculty involvement, especially writing and editorial work for one of the school's three scholarly publications. The *Duke Law Journal* is a student-edited publication managed in the traditional mold. *Law and Contemporary Problems* is an interdisciplinary publication edited by students working with a faculty board responsible for long-term planning and policy. The *Alaska Law Review*, which first appeared in 1984, is written and edited by students working with a faculty board responsible for assuring appropriate service to the Alaska Bar Association which cosponsors the publication. Each of these journals has a substantial circulation. The proportion of Duke students writing and editing for such publications is the highest of any law school.

The substance of law study at Duke is otherwise largely the same as that presented elsewhere; all American law schools study the same general subject. First-year offerings are especially conventional. The Duke law curriculum, like that of other

fine schools, does offer a few features that reflect interests, traditions, or opportunities that are special if not unique. Especially rich are the offerings on the law bearing on the conduct of the "private sector," comparative and international law, legal theory, and legal history. Also of special interest is the unusual offering of clinical instruction.

The Duke program is not ideal for all applicants. Especially for those who prefer anonymity, or who value the right to remain passive in the assimilation of learning provided by others, Duke is not likely to be the best choice. Nor is it likely to be best for those who wish to test themselves in an atmosphere of unrestrained academic competition.

Law Study and Professional Competence

Prospective law students share in the objective of achieving professional competence. Interest in this goal has been heightened in recent years by expressions of doubt about the competence of lawyers that have come from persons highly placed in the profession. Some have suggested that law schools are doing less than they should to assure the competence of their graduates.

Beginning law students should perhaps be warned that the professional competence of graduates is not an assurance that any program of university instruction in law can make. Most Duke alumni are very competent, indeed, to perform their work. In part, this competence is the result of training and learning acquired at Duke. But students partaking of the program cannot be promised competence to perform any professional task they may be assigned. One reason is that law students will, as lawyers, perform an enormous diversity of services. Merely defining general legal competence is a task beyond our present capacity; only if the work is more narrowly defined does the objective have meaning. Most students do not have sharply defined career objectives.

A second reason for diffidence is that the ingredients of competence, insofar as we understand them, include diverse personal traits that a university has but limited capacity to influence and no ability to control after graduation. Competence is, for the most part, a condition or a habit that lawyers must impose upon themselves.

Thirdly, it is true that much lawyer work is not of the sort that makes rigorous intellectual demands. The University seeks to maintain an environment in which questioning and speculation are the normal disposition. Such an institution is inefficient and ineffective when its energies are applied to the more confining tasks of technocracy that may be a part of many lawyers' work.

For these reasons, it will remain true for all graduates, to varying degrees, that they will leave the law school with some distance yet to go in order to achieve the level of competence at professional work which they should expect of themselves.

This is not to say that academic law training at Duke, or elsewhere, is unrelated to professional competence. The skills of reading, writing, speaking, listening, and thinking are elevated by academic work in law, and they are the basic skills of lawyers. Thus, most of the Duke program of individual instruction is especially helpful in achieving professional competence.

Moreover, there is very little work of importance that is performed by lawyers that does not depend in part on an understanding of the law, which is the central object of academic study. While mastery of law as an intellectual discipline is not a guarantee of competence, it is certainly a major component. Indeed, it is true for the most challenging work performed by lawyers that highly theoretical study is the best preparation. Many professional tasks call for imagination, judgment, and wisdom; these are traits that are associated with the pursuit of law as an intellectual discipline. Development of such traits is, to be sure, an enterprise to be extended over the whole of a career and is not the end of university law training. The office of academic law study is to open minds to the range of possibilities that may be pursued by those who aspire to still deeper understanding and stronger mastery of the subject.

It may be that the most important effects of a Duke law education on lawyer competence are not immediately aimed at job performance. Thus, among the tasks that the faculty sets for itself is to enable students to perceive law as a humanist discipline, demanding in its intricacy, but incorporating at times the whole range of human experience. What students bring to law study in understanding history, philosophy, literature, anthropology, and a dozen other disciplines is truly relevant and ought not to be left at the portals of courtrooms and law offices. The lawyer who retains a generous sense of relevance is more likely to grow in wisdom and judgment over the longer term of his or her career.

Also, competence seems to be closely associated with the pride and self-esteem of individual professionals. It is no small source of pride if law students can know that they have met some of the most intractable problems that men and women can meet, and have yet performed with credit.

Finally, competence seems also to be associated with professional integrity because it depends on a willingness to perform even when rewards are postponed, or unpromised. One feature of law that is fully revealed only to those who have pursued it rigorously is that even at its worst, when the law is stupid or cruel, it retains a tendency to improve itself. If thus seen to reflect a heartening idealism, it provides a comfort to the lonely practitioner in those moments when he or she is tempted to forsake craftsmanship, to overreach or neglect a client.

In these ways, the kind of experience that Duke seeks to provide is preparation more for a career than for a job.

Conclusion

Duke does not expect law students to come with well-defined career goals. It does expect that they will bring a respect for the academic enterprise and a curiosity about the institutions and values of law. It also expects that those who leave will share a commitment to the craft of law, and a spirit that will help them bear important responsibilities through all of their productive years, with credit to themselves and to one another. The contribution that Duke hopes to make is to provide an environment in which such shared commitments can germinate and flourish.

Law Faculty



Presented here are faculty holding professorial rank in the Law School, or academic appointments requiring full-time academic service in the Law School of an extended term of years.

Richard F. Babcock, *Professor of Law*

A.B. 1940, Dartmouth College; J.D. 1946, M.B.A. 1950, University of Chicago. Mr. Babcock practiced planning law in Chicago for thirty years. He has also served as President of the American Planning Association from 1971-72; and Chairman of the Advisory Committee of the American Law Institute Project on a Model Land Development Code from 1965-75. He has written four books, including *The Zoning Game*, and has lectured widely on land-use planning and related topics. Mr. Babcock teaches in the area of land-use planning.



Katharine Tiffany Bartlett, *Professor of Law*

B.A. 1968, Wheaton College; M.A. 1969, Harvard University; J.D. 1975, University of California, Berkeley. A native of Connecticut, Professor Bartlett served for three years as a secondary school teacher in that state before entering law school. She commenced her legal career with a judicial clerkship in the Supreme Court of California. From 1976 to 1979, she worked as a staff attorney at the Legal Aid Society of Alameda County in Oakland, California, concentrating on law reform and major impact litigation. She began teaching at Duke in 1979. Her special areas of interest include child advocacy, family law, and public school law. She will be on leave during the 1985-86 academic year.



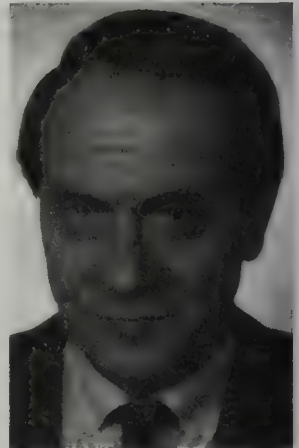
Sara Sun Beale, Professor of Law

B.A. 1971, J.D. 1974, University of Michigan. A native of Toledo, Ohio, Professor Beale's experience includes a judicial clerkship on the United States Court of Appeals, as well as a year in private practice in Detroit, Michigan. In 1976 she joined the United States Department of Justice, where she served one year in the Office of Legal Counsel, and two years in the Office of the Solicitor General. She began her teaching career at Duke in 1979. Her principal academic interests are in the field of criminal law and procedure.



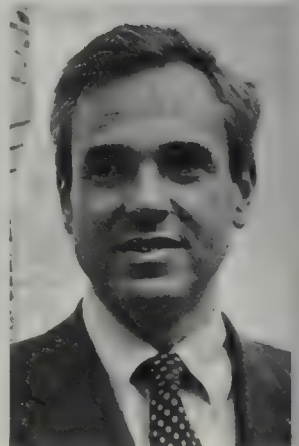
Herbert L. Bernstein, Professor of Law

B.A. 1953, Dr. jur. 1962, Hamburg University, Germany; J.D. 1967, University of Michigan. A native of Germany, Professor Bernstein practiced as a junior lawyer until 1958 and a regular member of the bar thereafter. Simultaneously, he was a research and teaching assistant at Hamburg University from 1956 to 1960. Since 1958 he has also been affiliated with the Max-Planck-Institute of Foreign and Private International Law. He taught at the University of California from 1967 to 1971; then returned to Hamburg University as Professor of Law. After a previous visit, he came to Duke from Hamburg in 1984. His teaching includes contracts, comparative law, and insurance. He is the author of numerous books and articles on diverse subjects in the fields of international law, conflict of laws, insurance, and business law.



H. Keith H. Brodie, James B. Duke Professor of Psychiatry and Law and President, Duke University

A.B. 1961, Princeton University; M.D. 1965, Columbia University. Dr. Brodie served at hospitals in New Orleans and New York City before becoming a Clinical Associate with the National Institute of Mental Health in 1968. In 1970, he joined the medical faculty of Stanford University. He was awarded a first prize in 1971 for research by the American Psychological Association. Dr. Brodie is a member of the Institute of Medicine of the National Academy of Sciences and he has chaired IOM's Board of Mental Health and Behavioral Medicine. He came to Duke in 1974 as Professor and Chairman of the Department of Psychiatry and Director of Psychiatric Services at Duke University Medical Center. He has also served as President of the American Psychiatric Association. His most recent book is *Modern Clinical Psychiatry*, published in 1982. He was first appointed to the law faculty in 1982.



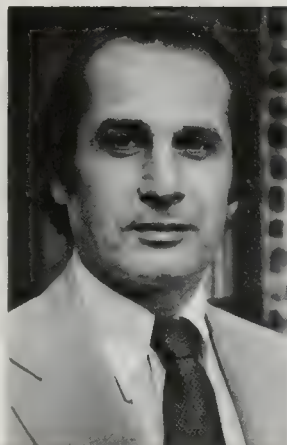
Paul D. Carrington, Professor of Law

B.A. 1952, University of Texas; LL.B. 1955, Harvard University. Professor Carrington is a native of Dallas, Texas. His professional experience includes a brief stint in private practice in Dallas and in a military law office, as well as occasional work for the American Civil Liberties Union and the American Association of University Professors. Since his teaching career began in 1957, he has taught at more than a dozen law schools, including most notably the University of Michigan, where he served from 1965 to 1978, before becoming Dean at Duke. He has been active in judicial law reform efforts, particularly in regard to appellate courts and procedure. He has also been involved in the affairs of the Association of American Law Schools, most recently as a member of its Executive Committee. His public activities also include a term on the Ann Arbor Board of Education. He has published in the fields of civil procedure, education law, and legal education. He teaches civil procedure and serves as Chairman of the Board of Editors of *Law and Contemporary Problems*.



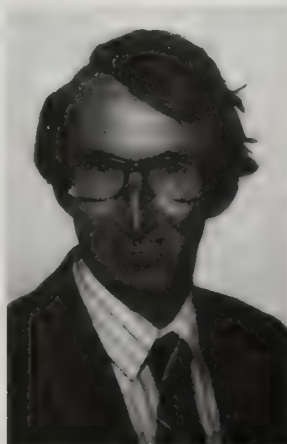
George C. Christie, James B. Duke Professor of Law

A.B. 1955, J.D. 1957, Columbia University; S.J.D. 1966, Harvard University. A native of New York City, Professor Christie was Editor-in-Chief of the *Columbia Law Review*. He commenced his legal career with private practice in Washington, D.C. In 1960-61, he was a Ford Fellow at Harvard Law School; and in 1961-62, he was a Fulbright Scholar at Cambridge University, where he earned a Diploma in International Law. He then joined the law faculty of the University of Minnesota, where he taught for almost four years. In 1966, he returned to Washington to serve as Assistant General Counsel for the Near East and South Asia of the Agency for International Development before coming in 1967 to Duke. His chief academic interests are in the areas of torts and jurisprudence, in both of which he has published widely. He is the editor of a casebook in jurisprudence published in 1973 and one on torts published in 1983. His monograph, *Law, Norms and Authority*, was published in 1982. He has been a visiting professor at the Universities of Michigan, Florida, Otago, and Witwatersrand and a fellow of the National Humanities Center.



James D. Cox, Professor of Law

B.S. 1966, Arizona State University; J.D. 1969, University of California, Hastings College of the Law; LL.M. 1971, Harvard University. Professor Cox is a native of Ellinwood, Kansas. He entered law teaching as a teaching fellow at Boston University, and has since taught at the University of San Francisco, Stanford University, and the University of California, Hastings College of the Law, before coming to Duke in 1979. He has focused his writing and teaching in the areas of corporate and securities law. Professor Cox is the author of a 1980 book on the utilization of financial information in the regulation of public corporations.



Jerome Culp, Associate Professor of Law

A.B. 1972, University of Chicago; A.M. 1974, J.D. 1978, Harvard University. Professor Culp is a native of Clarksville, Pennsylvania. While in law school he served as senior editor of the *Harvard Civil Rights-Civil Liberties Law Review*. His experience includes a research fellowship with the Rockefeller Foundation and a judicial clerkship in the U.S. Court of Appeals. He came to Duke from Rutgers in 1985. His principal work to date is in the area of employment discrimination and economic analysis of law. He will be teaching torts and employment discrimination.



Richard A. Danner, Associate Professor of Legal Research

B.A. 1969, M.S. 1975, J.D. 1979, University of Wisconsin. Professor Danner comes from Madison, Wisconsin. Prior to joining the library staff at Duke as Associate Law Librarian in 1979, he was Environmental Law Librarian at the University of Wisconsin. He assumed directorship of the Law Library in 1981. His teaching interests are in legislation and in legal writing and research. He is the editor of the *Law Library Journal* and has contributed to professional journals in law librarianship and library science. His book, *Legal Research in Wisconsin*, was published in 1980.



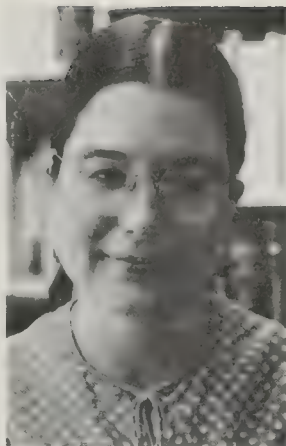
Walter E. Dellinger III, Professor of Law

A.B. 1963, University of North Carolina; LL.B. 1966, Yale University. Professor Dellinger is a native of Charlotte, North Carolina. He taught political and civil rights at the University of Mississippi from 1966 to 1968. In 1968-69, he served as a judicial clerk in the Supreme Court of the United States. He joined the Duke law faculty in 1969, serving as Associate Dean from 1974 to 1976 and as Acting Dean from 1976 to 1978. He has also taught at the University of Southern California, the University of Michigan, and the Catholic University of Geneva. He has, from 1972-78, served as Consultant and Draftsman to the North Carolina Criminal Code Commission. He teaches constitutional law and history.



Deborah A. DeMott, Professor of Law

B.A. 1970, Swarthmore College; J.D. 1973, New York University. Professor DeMott spent her early years in DuBois, Pennsylvania. She served as Articles Editor of the *New York University Law Review*. She began her professional career with a judicial clerkship in a federal court in New York City, and later practiced with a large law firm in that city, until she joined the Duke law faculty in 1975. She has also taught at the University of Texas. She is the editor of a 1980 book on corporate governance. Her other writing is on the fields of corporate law and securities regulation. She will be on leave during the spring semester of 1986.



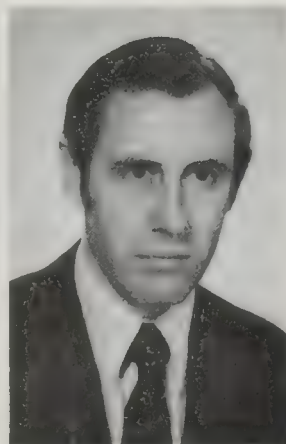
Robinson O. Everett, Professor of Law

A.B. 1947, J.D. 1950, Harvard University; LL.M. 1959, Duke University. Professor Everett is a native of Durham, North Carolina. He served for several years as a Legal Officer in the Air Force and as a Commissioner of the United States Court of Military Appeals. He returned to Durham to enter a general practice, which he continued until 1980 when he ascended to the bench of the United States Court of Military Appeals as Chief Judge. From 1961 to 1964, he served as Counsel to the Subcommittee on Constitutional Rights of the United States Senate Judiciary Committee. He has been active in the affairs of the North Carolina Bar and of the community of Durham. He has long served as a Commissioner on Uniform State Laws and has been active in various law reform efforts. He has published on many legal topics, most notably military justice and local government law. His teaching at Duke began as early as 1950. He was elected to regular membership in the faculty in 1967. He is on part-time leave.



Peter G. Fish, Professor of Political Science and Law

A.B. 1960, Princeton University; A.M. 1965, Ph.D. 1968, The Johns Hopkins University. Professor Fish has served as guest scholar at the Brookings Institution and taught at Oberlin and Princeton before coming to Duke in 1969. He is author of *The Politics of Federal Judicial Administration* (1973). From 1977-79 Professor Fish served as a lay member of the United States Circuit Judge Nomination Commission, Panel for the Fourth Circuit. He teaches a seminar on the politics of judicial administration.



Stanley E. Fish, Professor of English and Law

B.A. 1959, University of Pennsylvania; M.A. 1960, Ph.D. 1962, Yale University. Professor Fish taught at the University of California, the University of Southern California, and The Johns Hopkins University before coming to Duke in 1985. His principal field has been the study of Milton; this interest evolved to produce important work on literary theory and his widely noted 1980 book: *Is There A Text in This Class?* Most recently he contributed to the application of literary theory to law and has written for legal publications.



John Hope Franklin, Professor of Legal History

A.B. 1935, Fisk University; M.A. 1936, Ph.D. 1941, Harvard University. A native of Oklahoma, Professor Franklin taught at Fisk University, North Carolina Central University, Howard University, Brooklyn College, and the University of Chicago, where he was the John Matthews Manly Distinguished Service Professor, before coming to Duke in 1982 as the James B. Duke Professor of History. He is now emeritus in history and continues his teaching in the Law School. He has served a president of several scholarly organizations, including the United Chapters of Phi Beta Kappa and the American Historical Association; as Pitt Professor of American History and Institutions at Cambridge University; and as a member of many national commissions and delegations, including the National Council on the Humanities and UNESCO. He has published several books, among which are *The Free Negro in North Carolina* (1943), *From Slavery to Freedom: A History of Negro Americans* (1947), *Reconstruction after the Civil War* (1961), *The Emancipation Proclamation* (1963), *A Southern Odyssey: Travelers in the Antebellum North* (1976), and *Racial Equality in America* (1976), in addition to numerous articles in professional journals.



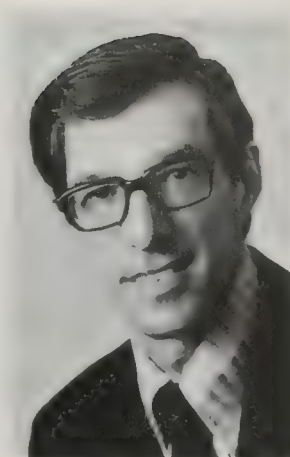
Pamela Gann, Professor of Law

B.A. 1970, University of North Carolina; J.D. 1973, Duke University. A native of Monroe, North Carolina, Professor Gann was Articles Editor of the *Duke Law Journal*. She practiced with private firms in Atlanta and Charlotte before returning to Duke to teach in 1975. She has also taught at Washington University and the Universities of Michigan, Virginia, Colorado, and San Diego. She is the coeditor of a 1984 casebook on corporate taxation. Her writing is primarily in the areas of taxation and international tax investments. In 1984, her work was supported by the Council on Foreign Relations.



Martin P. Golding, Professor of Philosophy and Law

B.A. 1949, M.A. 1952, University of California, Los Angeles; Ph.D. 1959, Columbia University. A native of New York City, Professor Golding taught at Columbia University from 1957 to 1970 and at the John Jay College of Criminal Justice of the City University of New York from 1970 to 1976 before coming to Duke in 1976 as Professor and Chairman of the Department of Philosophy. He has also taught at New York University, Bar-Ilan University in Israel, and the Universities of California (both Berkeley and Los Angeles), Southern California, and Colorado. His writing includes three books, *The Nature of Law* (1966), *Philosophy of Law* (1975), and *Legal Reasoning* (1984), and numerous articles on jurisprudence and ethics.



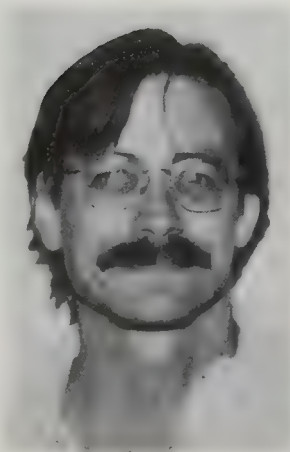
Daniel Arthur Graham, Professor of Economics and Law

B.S. 1967, West Texas State University; Ph.D. 1969, Duke University. Professor Graham is a native of Amarillo, and has been a member of the Duke economics faculty since 1969. His most important work is *Microeconomics: The Analysis of Choice*, published in 1980. In recent years, his writing has been increasingly devoted to subjects that intersect both law and economics, and he has been teaching economics in the summer-entering law program. He joins the law faculty in 1984.



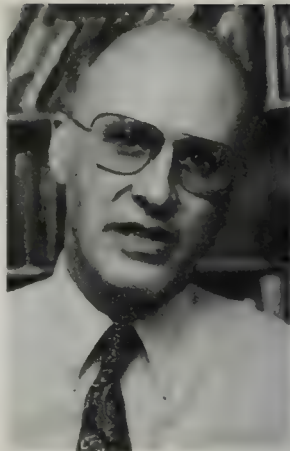
Paul H. Haagen, Assistant Professor of Law

B.A. 1972, Haverford College; B.A. 1974, Oxford; M.A. 1976, Princeton; J.D. 1982, Yale. Professor Haagen was born in Lancaster, Pennsylvania and raised in Connecticut. After graduating from college, he studied history first at Oxford as a Rhodes Scholar, and later at Princeton, where he also taught. In law school, he was an editor of *Yale Studies in World Public Order* and editor-in-chief of the *Yale Law and Policy Review*. Since law school, he has clerked on the United States Court of Appeals and then practiced law in Philadelphia for two years. His principal academic interests are legal history and international law.



Clark C. Havighurst, Professor of Law

A.B. 1955, Princeton University; J.D. 1958, Northwestern University. Professor Havighurst is a native of Evanston, Illinois. He spent two years in military service, one year as a Research Associate at Duke, and three years in private law practice in New York City before beginning his teaching career at Duke in 1964. Professor Havighurst was for five years the editor of *Law and Contemporary Problems*. In addition to teaching antitrust law and the law of regulated industries, he has a special academic interest in the regulation of the health care industry and in national health policy. His book, *Deregulating the Health Care Industry*, was published in 1982. Professor Havighurst is Director of the Law School's Program on Legal Issues in Health Care, and he has served as Scholar in Residence at, and is a member of, the Institute of Medicine of the National Academy of Sciences. He has also been a resident consultant to the Federal Trade Commission in Washington, D.C., and is an Adjunct Scholar in Law and Health Policy of the American Enterprise Institute. He has also taught at Stanford, Northwestern, and Michigan.



Donald L. Horowitz, Professor of Law

A.B. 1959, LL.B. 1961, Syracuse University; LL.M. 1962, M.A. 1965, Ph.D. 1967, Harvard University. A native of New York City, Professor Horowitz began his professional career as a judicial clerk in the United States District Court. With the exception of a stint as a government lawyer, he has primarily been engaged in research at the Harvard University Center for International Affairs, the Council on Foreign Relations, the Brookings Institution, and the Smithsonian Institution. A recipient of a grant from the Guggenheim Foundation for work in ethnic relations, Professor Horowitz has published several books. Among them are *The Jurocracy*, a book about government lawyers, and *The Courts and Social Policy*, for which he was awarded the Louis Brownlow Prize of the National Academy of Public Administration in 1977. Professor Horowitz came to Duke in 1982 and has served as a fellow of the National Humanities Center.



David L. Lange, Professor of Law

B.S. 1960, LL.B. 1964, University of Illinois. Professor Lange practiced law with a Chicago firm that included media enterprises among its clients. He has also had substantial professional experience in radio, television, cable, and motion picture production, and has served as a member of the Governing Committee of the ABA Forum on the Entertainment and Sports Industries. He joined the Duke law faculty in 1971, where he has since served as General Editor of *Law and Contemporary Problems* and as Chairman of the Center for the Study of Communications Policy. His principal academic interests lie in the areas of intellectual property, entertainment, and communications law.



William E. Leuchtenburg, Professor of Legal History

B.A. 1943, Cornell University; M.A. 1944, Ph.D. 1951, Columbia University. Professor Leuchtenburg holds the Kenan Chair in History at the University of North Carolina and previously held the DeWitt Clinton Chair at Columbia. He has also taught at Oxford University, and previously at the Law School. His field is modern American history with emphasis on the Roosevelt era; his latest book is on the legacy of Franklin Roosevelt and its impact on American presidents from Truman to Reagan. He teaches in the area of constitutional history.



Percy R. Luney, Jr., Martha Price Research Fellow and Senior Lecturer in Law

A.B. 1970, Hamilton College; J.D. 1974, Harvard University. Professor Luney devoted a year of study to economic geology in the sub-Sahara as a Thomas J. Watson Fellow and taught that subject for a year at Cornell after completing law school. He thereafter practiced law in the Department of the Interior and with a private firm practicing primarily in the land and resource development area. In 1980, he joined the faculty of North Carolina Central University where he has also served as Assistant Dean. He has been a Fellow of the North Carolina Japan Center, and was a Visiting Scholar at the University of Tokyo for the fall semester of 1983. At Duke, he will teach in the area of Japanese Law.



Richard C. Maxwell, Harry R. Chadwick, Sr., Professor of Law

B.S.L. 1941, LL.B. 1947, University of Minnesota; LL.D. (Hon.) California Western University. Professor Maxwell is a native of Minnesota. He started his academic career at the University of North Dakota and has been a faculty member at the University of Texas and UCLA. He was counsel to the Amerada Petroleum Corporation during the early development of the Williston Basin and served for a decade as dean of the law school at UCLA, where he was also Connell Professor of Law. He has held visiting chairs at the University of Minnesota, the University of Singapore, and the University of Colorado and was Fulbright Lecturer at Queen's University, Belfast. In 1972 he was President of the Association of American Law Schools. He is an editor of the *Oil and Gas Reporter* and most of his scholarship in recent years deals with mineral law. He has published books on social legislation, real property security transactions, and oil and gas law. He joined the Duke faculty in 1979.



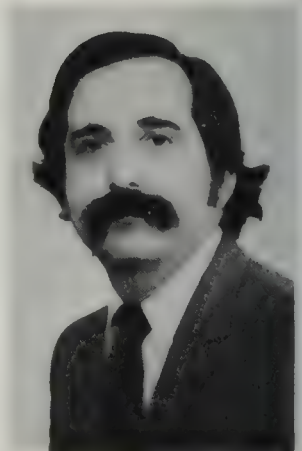
Thomas B. Metzloff, Associate Professor of Law

B.A. 1976, Yale College; J.D. 1979, Harvard University. Professor Metzloff is a native of Buffalo, New York. He began his professional career with a judicial clerkship on the United States Court of Appeals, followed by a clerkship with the Supreme Court of the United States. He then practiced with a private firm in Atlanta before accepting a position at Duke in 1985. He has written articles on attorney malpractice. He will be teaching civil procedure, as well as professional responsibility and a course on professional liability.



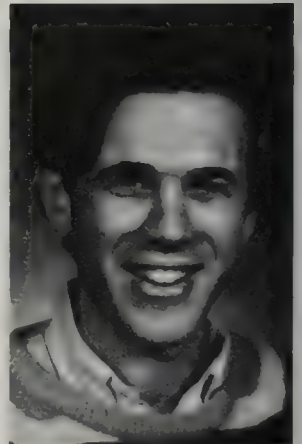
Robert P. Mosteller, Associate Professor of Law

B.A. 1970, University of North Carolina at Chapel Hill; J.D. 1975, Yale University; M.P.P. 1975, Harvard University. Professor Mosteller is a native of Vale, North Carolina. After serving as a judicial clerk, Professor Mosteller joined the District of Columbia Public Defender Service as a staff attorney. During seven years with the Public Defender Service, he was Director of Training and Chief of the Trial Division. He will be teaching Evidence, Criminal Trial Practice, and the Criminal Litigation Clinic.



Jonathan K. Ocko, Associate Professor of Legal History

B.A. 1966, Trinity College; M.Phil. 1971, M.A. 1972, Ph.D. 1975, Yale University. A native of New York City, Professor Ocko taught at Clark University and Wellesley College before joining the faculty of North Carolina State University in 1977. During the academic year 1978-79, he studied law at Harvard University, where he also taught Asian law. His principal scholarly efforts have been in the field of Chinese history and law. His book, *Bureaucratic Reform in Provincial China*, was published in 1982. In 1983, he was appointed to a part-time professorial position in the Law School.



J. Francis Paschal, Professor of Law

A.B. 1935, LL.B. 1938, Wake Forest College; A.M. 1942, Ph.D. 1948, Princeton University. A native of Wake Forest, North Carolina, Professor Paschal taught law there briefly following his graduation. In 1940, he commenced the study of politics, which was interrupted for four years of service in the Navy. After completing his doctorate in politics following the war, he returned to law as the Research Director for the North Carolina Commission for the Improvement of the Administration of Justice. From 1949 to 1954, he practiced law with a private firm in Raleigh. He joined the Duke law faculty in 1954. He has since served a term as Chairman of the North Carolina Advisory Committee to the Civil Rights Commission and on the North Carolina General Statutes Commission. He has been Chairman of the University's Academic Council. He has written on a variety of legal subjects, including a full-length biography of Justice George Sutherland of the United States Supreme Court.



Walter F. Pratt, Jr., Associate Professor of Law

B.A. 1968, Vanderbilt University; D.Phil. (Politics) 1974, Oxford University; J.D. 1977, Yale University. Professor Pratt is a native of Mississippi. He served for three years with the Army before his term as a Rhodes Scholar. He served as Articles Editor of the *Yale Law Journal* while completing work on his book, *Privacy in Britain*. He commenced his career in law with one judicial clerkship in the United States Court of Appeals, going on to another in the Supreme Court of the United States. He joined the Duke law faculty in 1979. His academic interests lie in the fields of legal history and contracts.



Evelyn M. Pursley, Lecturer in Law

B.A. 1973, University of Oklahoma; M.L.S. 1975, University of Oklahoma; J.D. 1984, Duke University. A native of Oklahoma, Ms. Pursley served as a school teacher and university librarian in that state before entering law school. While at Duke she was executive editor of *Law and Contemporary Problems*. After graduating from law school, she served as a law clerk for the United States Court of Appeals. She returns to Duke in 1985 as Assistant Dean for Alumni and Development. She will also be teaching in the clinical program.



A. Kenneth Pye, *Samuel Fox Mordecai Professor of Law*

B.A. 1951, University of Buffalo; J.D. 1953, LL.M. 1955, LL.D. 1978, Georgetown University; L.H.D. 1979, Belmont Abbey College. Professor Pye is a native of New York. Following graduation from law school, he entered military service, after which he joined the law faculty of Georgetown University, where he served as Associate Dean from 1961 to 1966. He joined the Duke law faculty in 1966. He has taught at a number of other universities, including Johann Wolfgang Goethe University in Germany, Banares Hindu University in India, Monash University in Australia, and the University of British Columbia. He became Dean of the Law School in 1968, serving for two years before becoming Chancellor of the University in 1970. He served for three years as University Counsel, served again as Dean of the Law School from 1974 to 1976, and again served as Chancellor from 1976 to 1982 and as Director of the Center for International Studies from 1982 to 1984. He served as President of the Association of American Law Schools in 1977 and was appointed Chairman of the Council for International Exchange of Scholars in 1984. He is known for his scholarship chiefly in the field of criminal procedure.



William Arneill Reppy, Jr., *Professor of Law*

A.B. 1963, J.D. 1966, Stanford University. Professor Reppy is a native of Oxnard, California. He commenced his professional career with two judicial clerkships—one in the Supreme Court of California, followed by another in the Supreme Court of the United States. He then practiced law for three years with a private firm in Los Angeles, until joining the Duke law faculty in 1971. He has also taught at the Universities of California, Michigan, Washington, and North Carolina. He is a member of the Condominium Statutes Drafting Committee of the North Carolina Statutes Commission. His principal scholarly work is in the areas of marital property rights and conflict of laws. He does pro bono legal work for the humane and animal rights movements.



Horace B. Robertson, Jr., *Professor of Law*

B.S. 1945, U.S. Naval Academy; J.D. 1953, Georgetown University; M.S. 1968, George Washington University. Professor Robertson is a native of Kannapolis, North Carolina. After five years as a line officer in the Navy, he was assigned to law study. After achieving a distinguished record, including service as Editor-in-Chief of the *Georgetown Law Journal*, he returned to active duty as a Judge Advocate, rising ultimately to be the highest ranking legal officer in the Navy in 1975. While on active duty, he served as a member of the United States Delegation to the United Nations Law of the Sea Conference in 1958 and to the United Nations Seabeds Committee's Preparatory Session in 1973. He joined the Duke law faculty in 1976. His primary teaching interests are in the fields of international law and torts.



Thomas D. Rowe, Jr., Professor of Law

B.A. 1964, Yale University; M.Phil. 1967, Oxford University; J.D. 1970, Harvard University. A native of Ann Arbor, Michigan, Professor Rowe achieved preeminent academic records both as an undergraduate and as a law student; in the interim, he was also a Rhodes Scholar. He commenced his professional career as a law clerk in the Supreme Court of the United States. He served for one and one-half years as Assistant Counsel to a Subcommittee of the United States Senate and then practiced law with a private firm in Washington, D.C. He joined the Duke law faculty in 1975 and served as Associate Dean from 1981 to 1984. He has also taught at Georgetown University. He has written in the fields of civil procedure, judicial remedies, and constitutional law. He will be on leave for the fall of 1985.



Joyce S. Rutledge, Senior Lecturer in Law

B.A. 1967, Goucher College; M.A. 1969, Ph.D. 1972, The Johns Hopkins University; J.D. 1981, Duke University. Ms. Rutledge was in the field of German literature before she undertook her legal training. While at Duke she was a member of the editorial board of *Law and Contemporary Problems*, and held several research assistantships. During 1981-82 she served as clerk for the U.S. Court of Appeals. Ms. Rutledge teaches legal writing, upperclass seminars in appellate advocacy, a seminar on religion and law, and also serves as General Editor of *Law and Contemporary Problems* and the *Alaska Law Review*, and as editor for *Duke Law Magazine*.



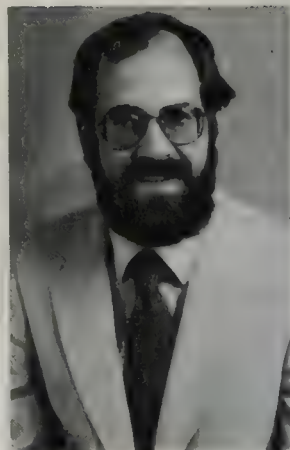
Richard L. Schmalbeck, Professor of Law

A.B. 1970, J.D. 1975, University of Chicago. Professor Schmalbeck is a native of Chicago, where he began his professional career as an economist with the Illinois Housing Development Authority in 1971. In 1973, he returned to law school at the University of Chicago, where he served as Associate Editor of the *University of Chicago Law Review*. Following law school graduation, he practiced law briefly in Columbus, Ohio, before accepting a position in Washington in 1976 as a Special Assistant to the Associate Director of the Office of Management and Budget. In 1977, he returned to private practice with a law firm in Washington, specializing in federal income tax. He began his teaching career at Duke in 1980, where his focus is on the fields of federal taxation and law and economics.



Christopher H. Schroeder, Professor of Law

B.A. 1968, Princeton University; M.Div. 1971, Yale University; J.D. 1974, University of California. Professor Schroeder is a native of Saginaw, Michigan. He served as Editor-in-Chief of the *California Law Review*. He practiced law with a San Francisco firm for two years before organizing a smaller firm in that city, where he engaged in environmental litigation in addition to a general litigation practice. He served as Director of the Energy and Environment Project of the Earl Warren Institute of the University of California and taught in the Energy and Resources Program and in the Law School of that university. He joined the Duke law faculty in 1979. He is also a Research Associate in the School of Forestry and Environmental Studies. He will be on leave for 1985-86.



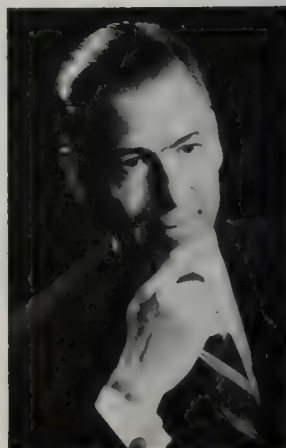
Melvin G. Shimm, Professor of Law

A.B. 1947, Columbia University; LL.B. 1950, Yale University. Professor Shimm is a native of New York City and served three years with the Army. He practiced law privately in New York City from 1950 to 1951 and as an attorney for the Wage Stabilization Board in Washington, D.C., from 1951 to 1952 before entering law teaching as a Bigelow Fellow at the University of Chicago from 1952 to 1953. He has been at Duke since 1953. He served as Associate Dean from 1978 to 1983. He has also taught at New York University and the Universities of Southern California, North Carolina, Michigan, and Texas. He has been heavily invested in the Law School's publication program, editing *Law and Contemporary Problems*, the *Journal of Legal Education*, and the American sections of the *Business Law Review* and the *Journal of Business Law*; and organizing and serving first as Faculty Editor and then as Faculty Adviser of the *Duke Law Journal*. He has also served as Senior Consultant with The Brookings Institution and as Director of the Association of American Law Schools' Orientation Program in American Law. His teaching interests lie primarily in the commercial law areas.



Bertel M. Sparks, Professor of Law

B.S. 1938, Eastern Kentucky University; LL.B. 1948, University of Kentucky; LL.M. 1949, S.J.D. 1955, University of Michigan. Professor Sparks was Editor-in-Chief of the *Kentucky Law Journal*, and then Cook Fellow at the University of Michigan. He taught at New York University from 1949 until he came to Duke in 1966. He has also taught at Michigan and Kentucky. He has also been a member of the Drafting Committee of the North Carolina General Statutes Commission since 1967. His writing includes two books, *Contracts to Make Wills* (1956) and *Cases on Trusts and Estates* (1965).



Gwynn T. Swinson, Senior Lecturer in Law

B.A. 1973, Antioch College; J.D. 1976, Antioch School of Law. Ms. Swinson has had experience in representing the interests of the federal government in civil matters. Appointed Assistant Branch Director, Commercial Litigation Branch, Civil Division, U.S. Department of Justice in 1980, she previously served as trial attorney for the department's Commercial Litigation and Federal Programs Branches. In addition to her responsibilities as Assistant Dean of Admissions, she teaches courses in trial practice and professional responsibility.



William W. Van Alstyne, William R. Perkins and Thomas C. Perkins Professor of Law

B.A. 1955, University of Southern California; J.D. 1958, Stanford University; LL.D. (Hon.) 1976, Wake Forest University; LL.D. (Hon.) 1979, College of William and Mary. Professor Van Alstyne is a native of Chico, California. He was professionally employed first by the California Department of Justice and then by the United States Department of Justice. He began his teaching career at Ohio State University in 1959, coming to Duke in 1965. He has taught at a number of other law schools, including Stanford University and the University of California at Berkeley and at Los Angeles, and at the Universities of Chicago, Illinois, and Pennsylvania. He studied at the Hague Academy of International Law in 1961 and was a Senior Fellow at Yale in 1964-65. He has long been active in civil rights and in the affairs of the American Civil Liberties Union. He has been especially active in the American Association of University Professors, serving as President in 1975-76. He is known for his writing and his speaking on the subject of constitutional law.



John C. Weistart, Professor of Law

A.B. 1965, Illinois Wesleyan University; J.D. 1968, Duke University; LL.D. (Hon.) 1981, Illinois Wesleyan University. Professor Weistart was Editor-in-Chief of the *Duke Law Journal*. He served for a year as a judicial clerk on the Supreme Court of Illinois before joining the Duke law faculty in 1969. He served for three years as Editor of *Law and Contemporary Problems* and as American Editor of the *Journal of Business Law*, and is a member of the American Law Institute. He has also taught at the Universities of California at Los Angeles, Virginia, Harvard, and Michigan. He is known for his writing in the field of commercial law, and has served as a consultant to the Federal Trade Commission and the Federal Reserve Board. He is also a frequent commentator on issues in the athletics industry.





Visiting Faculty

Nicholas M. Bala, *Visiting Professor of Law (Queens University, Canada)*
Lawrence G. Baxter, *Visiting Professor of Law (University of Natal, Pietermaritzburg)*
Martha E. Chamallas, *Scholar in Residence (University of Iowa)*
Arnold N. Enker, *Visiting Professor of Law (Bar Ilan University)*
Michael B. Evans, *Scholar in Residence (New South Wales Institute)*
Koichiro Fujikura, *Visiting Professor of Law (University of Tokyo)*
Peter F. Glavovic, *Scholar in Residence (University of Natal, Durban)*
Guy Haarscher, *Visiting Professor of Law (Free University of Brussels)*
Beatrice U. Pfister, *Scholar in Residence (University of Berne)*
Peter M. Shane, *Visiting Professor of Law (University of Iowa)*
Masahiro Usaki, *Scholar in Residence (Tsuru University)*

Extended Faculty

Jean T. Adams, *Senior Lecturer in Law*
Charles L. Becton, *Senior Lecturer in Law*
Donald H. Beskind, *Senior Lecturer in Law*
Michael G. Chiorazzi, *Instructor in Legal Research*
Kathryn M. Christie, *Instructor in Legal Research*
Calvin J. Collier, *Senior Lecturer in Law*
Harry T. Edwards, *Senior Lecturer in Law*
Donald M. Ethridge, *Lecturer in Law*
Joel L. Fleishman, *Professor of Law and Public Policy Sciences*
C. Allen Foster, *Senior Lecturer in Law*
Kip A. Frey, *Teaching Fellow*
Daniel M. Friedman, *Senior Lecturer in Law*
Claire M. Germain, *Lecturer in Comparative Law and Legal Research*
Cynthia M. Herrup, *Lecturer in Legal History*
F. William Hutchinson, *Senior Lecturer in Law*
Sally C. Johnson, *Senior Lecturer in Psychiatry and Law*
Lex K. Larson, *Senior Lecturer in Law*
Ralph McCaughan, *Lecturer in Law*
Michael J. Meurer, *Lecturer in Economics and Law*
James L. Oakes, *Senior Lecturer in Law*
John S. Pennell, *Senior Lecturer in Law*
J. Dickson Phillips, *Senior Lecturer in Law*
William P. Pinna, *Senior Lecturer in Law*
L. Richardson Preyer, *Senior Lecturer in Law*
Alvin B. Rubin, *Senior Lecturer in Law*
Allen G. Siegel, *Senior Lecturer in Law*

Admissions



The admissions process for the typical law school applicant is at best onerous. The Law School is aware of the difficulties and uncertainties faced by applicants, and strives to treat each applicant with fairness and candor. The following description of the admissions process at Duke is presented with that object in mind.

Admissions Standards

At Duke, as at many law schools, the three most important criteria, in the order of their importance, are the Law School Admission Test (LSAT) score, the undergraduate grade point average (GPA), and the undergraduate institution attended.

Although reliance on purely academic criteria is appropriate in making some decisions, particularly those involving candidates either clearly admissible or clearly inadmissible, the majority of applications fall between these extremes. For these applications, Duke will give careful consideration to more subjective factors such as proven capacity for leadership, dedication to community service, excellence in a particular field, motivation, graduate study in another discipline, work experience, extracurricular activities, and personal and character information provided in letters of recommendation. Also, in interpreting the applicant's GPA, it is often necessary to make judgments regarding the strength of the course of study pursued and the significance of class rank or the progression of grades.

Although no quotas of any kind are employed in the admissions process, the Law School does make a conscious effort to achieve a broad diversity in each entering class in terms of general background, geography, and undergraduate institutions represented. An individual student may be selected not only for his or her marked potential for academic success, but also because application materials indicate that he or she can bring to Duke unique personal qualities or talents that will enhance the overall character of the entering class.

Duke has a faculty-initiated affirmative action plan for minority admissions, and special care is taken in evaluating applications from members of minority groups who traditionally have not been well represented in the legal profession. On occasion, special consideration is given to children of alumni of Duke University who are qualified to do acceptable work. Female applicants are evaluated according to the same standards as male applicants, and applications from women are encouraged.

An applicant who has been graduated from an accredited college, or one who will have been graduated from an accredited college during his or her course of study at the Law School, may be admitted as a candidate for the degree of Juris Doctor (J.D.). On rare occasions, an exceptionally qualified applicant may be admitted as a candidate for the degree of Bachelor of Laws (LL.B.).

Admission Procedures: J.D. Program

The Admissions Committee receives its authority by delegation from the law faculty and reports to the law faculty. The Committee, composed of four law professors and three law students, decides policy questions arising in the admissions process. Student members of the Committee, however, do not review individual files. All individual applications are reviewed by the Assistant Dean responsible for admissions.

Each applicant is responsible for collecting and submitting, together with the school's application for admission, the following documents:

1. Completed application form obtained from the Office of Admissions, Duke Law School, Durham, North Carolina 27706. A recent photograph should be attached to the application.
2. The Law School Application Matching Form which is issued to each applicant taking the Law School Admission Test.
3. Three completed reference forms, one of which should be written by an appropriate academic dean at the undergraduate school last attended. A statement of the applicant's rank in class will be helpful. It is suggested that the other reference forms be written by professors who have personal knowledge of the academic performance and potential of the applicant. Applicants who have been out of school for some time may substitute letters from employers or others who are well acquainted with their personal traits and intellectual potential. These references must be returned in sealed envelopes which are provided with the application form.
4. A nonrefundable processing fee of \$45. This application fee is not waivable except in cases of extreme personal hardship.
5. Financial aid forms. All applicants are required to return these forms; those not wishing to be considered for aid may so indicate.

The application must be entirely ready for processing and evaluation when it arrives.

Applicants are strongly urged to take the Law School Admission Test (LSAT) no later than December. Registration forms and information should be procured by writing directly to Law School Admission Services (LSAS), Box 2000, Newtown, Pennsylvania 18940. Applicants who are handicapped should contact LSAS directly for information concerning special accommodations for taking the LSAT.

Applicants must arrange for the submission of transcripts from all undergraduate and graduate schools attended to the Law School Data Assembly Service (LSDAS), Box 2000, Newtown, Pennsylvania 18940.

Duke has no formal deadline for the submission of applications. Review of completed applications begins in December and continues until the class is filled. However past experience indicates that students applying after February 15 are rarely accepted, and that those completing applications early may have a more favorable chance of admission.

Personal interviews are generally not considered in making admissions decisions and, therefore, are not required. Interviews may be arranged, however, if there are special circumstances that cannot be adequately described in writing. It is Duke's assumption that the usual purpose for an interview is to provide the applicant with information about the school.

Each applicant extended an offer of admission will be given a reasonable amount of time to respond. An admission agreement will be sent to admitted candidates specifying the amount of deposit or other security required to hold a place in the class. Only in rare cases will offers be extended prior to January 15 or after May 1. After

May 1, a waiting list is established and held open until the registration date. Offers are extended to applicants on the waiting list as withdrawals occur.

Admission to the Law School is conditional upon receipt of a final official transcript of all undergraduate and graduate work undertaken by the candidate.

Admission Procedures: Summer Joint Degree Program

Procedures for admission to the summer joint degree program are no different from those established for the regular J.D. program commencing in the fall semester. Applicants should indicate on the application form that they are applying to the summer program and designate either the LL.M. program offered by the Law School, or the Graduate School department in which they wish to pursue the M.A. Applicants to the LL.M. program are selected by the Law School Admissions Committee. The selection process for M.A. applicants is bifurcated. Upon a favorable decision by the Law School Admissions Committee, the M.A. applicant's file will be forwarded to the appropriate Graduate School department for review. Applicants must be formally admitted to the M.A. program by the Graduate School.

Students must elect whether they wish to be considered for entrance in the summer or fall, and may not be considered concurrently for admission to both programs. A student wishing to change that election may do so without payment of an additional processing fee. However, the Admissions Committee will treat the application to the alternate program as newly completed; thus a late change in election may prejudice the applicant's chance for admission. This policy reflects our need for a firm commitment from applicants regarding which program they wish to enter so that we may deal fairly with all applicants competing for a limited number of spaces in each class. Although applicant pools may change from year to year, our experience has been that competition for spaces is approximately equal for the two programs.

Other Joint Degree Programs

Applicants for any of the other joint degree programs offered by the Duke Law School are considered for admission to both schools on the same basis as those applicants who are applying for the individual programs. The admission decision of one school has no bearing on the admission decision of the other school. If accepted for admission by both schools, the applicant is automatically eligible to participate in the established joint degree program. Students planning to participate in such programs should notify the Law School immediately upon their admission.

Master of Legal Studies

Admission to this degree program is limited to persons who have achieved distinction in law-related professional work or who are pursuing law-related graduate degrees in other fields. Application to the program proceeds in exactly the same manner as for the J.D. program, with the single exception that the LSAT is not required of applicants who have taken the Graduate Records Examination in their primary field of study. Applicants who wish to substitute the GRE score should have an official report sent to the Admissions Office.

Reactivating Admissions Files

If an applicant has applied for admission in a previous year and was not extended an offer of admission or chose not to enter during that academic year, he or she may request that the file be reactivated for consideration by the Admissions Committee. The applicant may wish to update his or her personal statement at that time. A non-refundable fee of \$45 is charged for processing the application, and a check or money



order for this amount must accompany the request for reactivation of the file. The applicant will not be required to reregister with the Law School Data Assembly Service (LSDAS) unless he or she retakes the LSAT after initially applying to the Law School.

Transfer Policy

In order to be considered for admission to Duke, a transfer applicant must present evidence of the satisfactory completion of one year of study at any law school that is a member of the Association of American Law Schools, and be eligible for readmission to that school. To be given serious consideration for admission, an applicant should rank in the top third of the class. Two academic years of law study must be completed at Duke.

The following items are required to complete a transfer applicant's admission file:

1. A nonrefundable processing fee of \$45;
2. Letter of certification from the Dean of the law school attended;
3. References from two professors who have personal knowledge of the academic performance and potential of the applicant;
4. Certified transcript of all grades earned in the first year of law school.

Ordinarily, it should not be expected that action will be taken upon transfer applications before July. Spring semester grades must be received before decisions can be made.

Graduate Study in Law

Admission to Duke to pursue law study beyond the basic professional degree is generally limited to J.D./LL.M. candidates and international students. For information about application to the graduate study program, see the description of admission procedures for the summer joint degree program or the section on international students.

University and Law School Rules

Students are subject to the rules and regulations of the University and the Law School that are currently in effect, or those that in the future may be promulgated by the appropriate authorities of the University. Every student, in accepting admission, indicates a willingness to subscribe to and be governed by these rules and regulations. The student also acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be appropriate, for failure to abide by these rules and regulations, or for other conduct adjudged unsatisfactory or detrimental to the University.

Financial Information



The cost of providing a legal education of the quality offered by Duke is high and has been steadily increasing. An annual report of the Law School explains in moderate detail what those costs are, and how they are met; a copy is available on request. As the report reveals, the Law School is substantially subvented by the University from its endowment sources. In addition, the Law School has some resources of its own, including generous annual giving support from its alumni. Nevertheless, the bulk of the cost of the program must be borne by the students who receive it.

Tuition

J.D. and LL.B. Candidates. The Law School has instituted an hourly rate for tuition for students entering in 1984 and later years. The tuition rate for 1985-86 will be \$330 per credit hour; this rate is commensurate with an average annual tuition of \$9,460.

Students will be required to pay for each hour for which they register at the rate then in effect subject to the following rules:

1. J.D. candidates must pay for eighty-six (86) credit hours in order to receive the degree, regardless of credit awarded for work done at other schools, except: (a) students receiving credit for a full year of work at the time of admission are required to pay for only sixty (60) hours of instruction at Duke and (b) students receiving a second Duke degree as joint degree candidates are required to pay for only eighty (80) hours of instruction in law.
2. *No charge* will be imposed for instruction exceeding the minimum number of hours for which the degree candidate is required to pay.

Under these rules, students taking the first year curriculum in 1985-86 will be required to pay \$5,280 for sixteen hours of instruction in the first semester, and \$4,950 for fifteen hours of instruction in the second semester, for a total first year tuition in 1985-86 of \$10,230. At the \$330 per hour rate, average tuition in the second and third years would be about \$9,075 for regular J.D. candidates.

Thus, the hourly tuition charge results in a proportionately higher bill in the first year when the student is taking a heavier load. While this might be considered an undesirable effect in some ways, that effect is largely offset by the fact that proportionately more of the student's total credits will be billed at current rates, thus softening the impact of future tuition increases.

M.L.S. Candidates. Tuition for the one-year M.L.S. program is set at \$10,230 for 1985-86.

Graduate Degree Candidates. Students pursuing the L.L.M. degree will pay tuition of \$9,900 in 1985-86 for their single year of instruction. S.J.D. candidates must enroll for two years; tuition for the S.J.D. program for 1985-86 is set at \$9,900.

Other Fees

Late Registration Fee. Students who register in any semester at a date later than that prescribed are required to pay a \$25 penalty.

Student Health Fee. A student health fee of \$180 (\$90 per semester) is charged to all Duke University students. Optional health insurance is available at a cost of \$173 for a single student, \$335 for married student coverage. These figures are approximations.

Athletic Events Fee. Law students may secure admission to all regularly scheduled University athletic contests, with the exception of football and basketball, held on University grounds during the entire academic year free of charge. A fee of \$20 is charged for football events only and \$75 for football, basketball, and soccer. This fee is payable in the fall semester. Students may also use the facilities of the Duke golf course upon payment of student green fees.

Duke Bar Association Fee. A \$13 fee each semester is due and payable not later than the day of registration for a particular semester. This fee is utilized exclusively to support the activities of the student bar association.

Parking Fee. Students wishing to drive to the campus may register a car for the Law School's parking lot at an annual fee of \$30.

General Expenses

Applicants should be aware that the following general expense estimates were compiled in the spring of 1985, and for future years appropriate revisions may be necessary to reflect inflationary increases. It should also be recognized that the expenses of a Duke law student may vary considerably according to the style of living assumed, travel distance, and size of family, if any. With the above cautionary statements in mind, the following are the best estimates of total living costs for a nine-month academic year excluding tuition and fees: approximately \$9,494 for single students; approximately \$12,607 for married students; and approximately \$15,757 for married with one child. Included in the above cost-of-living estimates are current expense levels for lodging, board, books (approximately \$825 if purchased new), supplies, transportation, and personal effects. Applicants for scholarships and federal loans should be aware that their proposed budget figures cannot exceed the above amounts.

University Policies for Payment of Accounts

Payment of Accounts for Fall and Spring. The Office of the Bursar will issue invoices to registered students for tuition, fees, and other charges approximately four to six weeks prior to the beginning of classes each semester. The total amount due on the invoice is payable by the invoice due date which is normally one week prior to the beginning of classes. As part of the admission agreement to Duke University, a student is required to pay all invoices as presented. No deferred payment plans are available. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions.

Penalty Charge. If the total amount due on an invoice is not received by the invoice due date, a penalty charge will be assessed from the billing date to the due date of that invoice. The penalty will be assessed on the subsequent invoice at an annual rate of 16 percent applied to the past due balance on that invoice. The past due balance is defined as the previous balance less any credits received and any payments received on or before the due date and also any student loan memo credits, related to the previous balance, which appear on the invoice.

Restrictions. An individual will be in default of this agreement if the total amount due on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a copy of the academic transcript, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Tuition Refunds. Tuition refunds are governed by the following policy:

1. In the event of death or a call to active duty in the armed services, a full tuition refund is granted.
2. First-year students withdrawing after the tuition due date for the summer or fall term are ineligible for any tuition refund.
3. In all other cases of withdrawal, students or their parents may elect to have tuition charges refunded or carried forward as a credit for later study according to the following schedule:
 - a. withdrawal before the beginning of classes—full refund;
 - b. withdrawal during the first or second week—80 percent;
 - c. withdrawal during the third through fifth week—60 percent;
 - d. withdrawal during the sixth week—20 percent
 - e. withdrawal after the sixth week—no refund; but
 - f. tuition charges paid from grants or loans will be restored to those funds and will not be refunded or carried forward.

Scholarship Assistance

Professional education is expensive. Unfortunately, the Law School must rely upon students to bear the primary burden of this cost, with such help as they may receive from families, governments, or other organizations. The Law School, however, does provide a number of substantial scholarships to entering students.

Scholarship awards are generally made in the form of a contract committing the school to a total grant to be disbursed over the student's entire period of enrollment in the Law School. The disbursement schedule advances proportionately more of the total grant in the first year, when tuition obligations are higher, and less in the third year when summer savings and permanent job prospects lessen the financial burdens of most students.

Students seeking scholarship assistance should file a financial aid application at the same time they apply for admission. Most awards are made just following the admission decision, so that applicants may receive the earliest possible notice of the extent of scholarship support available. The fact that a student has applied for financial aid will not affect the decision on the application for admission.

Merit Awards. The Law School competes for students with several fine institutions which enjoy longer traditions of excellence. In order to assure each entering class that it will have a solid core of outstanding members who are admissible to any law school, many awards are made each year based primarily on merit. Merit, for this purpose, is usually defined as extraordinary academic promise manifested by grades and test scores which are substantially above the class medians. But merit, for this

purpose, also includes extraordinary achievement or unusual experience or background. It is not to be supposed that persons receiving such awards are more meritorious, in the broadest sense of that word, than many other entering students whose admissions credentials may seem a bit less unusual. Indeed, many students who do not receive merit awards will prove to be more deserving of praise as law students. But, it is believed, all students at the school are benefited by the solid assurance given that Duke law students as a group are among the ablest to be found anywhere.

While financial circumstance is a factor in awarding many of these scholarships, the primary purpose of these awards is to assure the quality of the entering class. Students receiving such awards are generally those who reasonably can be expected to make significant contributions to the community, by reason of their exceptional academic promise, extraordinary achievements, and valuable experience or background.

Need Awards. The Law School also provides a number of smaller scholarships that are intended primarily to aid those students who are most in need of financial assistance. In order to qualify for assistance of this kind, students must have a report prepared for the Law School by the Graduate and Professional School Financial Aid Service (GAPSFAS), Box 2614, Princeton, New Jersey 08540. In order to insure that full consideration of financial need is possible at the time when most of our scholarship funds are awarded, such students are also required to provide accurate information regarding family income and other relevant circumstances on the Duke financial aid application. Inclusion of parental information on the Duke form is mandatory, regardless of whether the student is technically considered "dependent" under federal guidelines. The Law School fully recognizes that many students are independent of their families for all purposes, but in choosing among competing student needs, those that cannot be met by parents will be accorded priority.

Endowed Scholarships. Many of the Law School's scholarships are funded from general endowment and other Law School revenues. However, some scholarship candidates are selected each year for support from one of several specially endowed scholarship funds. The criteria for these named awards vary; all students applying for aid will be considered for any special scholarships for which they may be eligible.

William Neal Reynolds Scholarships were established by the Z. Smith Reynolds Foundation in honor of the brother of R. J. Reynolds, the founder of the tobacco company.

Bunyon S. Womble Scholarships were established by the Womble family in honor of the founder of a North Carolina law firm.

James A. Bell Scholarships were established by the Bell family in honor of a federal judge.

Elvin R. Latty Scholarships were established by alumni and friends in honor of a former Dean of the Law School.

Dunspaugh-Dalton Foundation Scholarships were established by a Miami foundation.

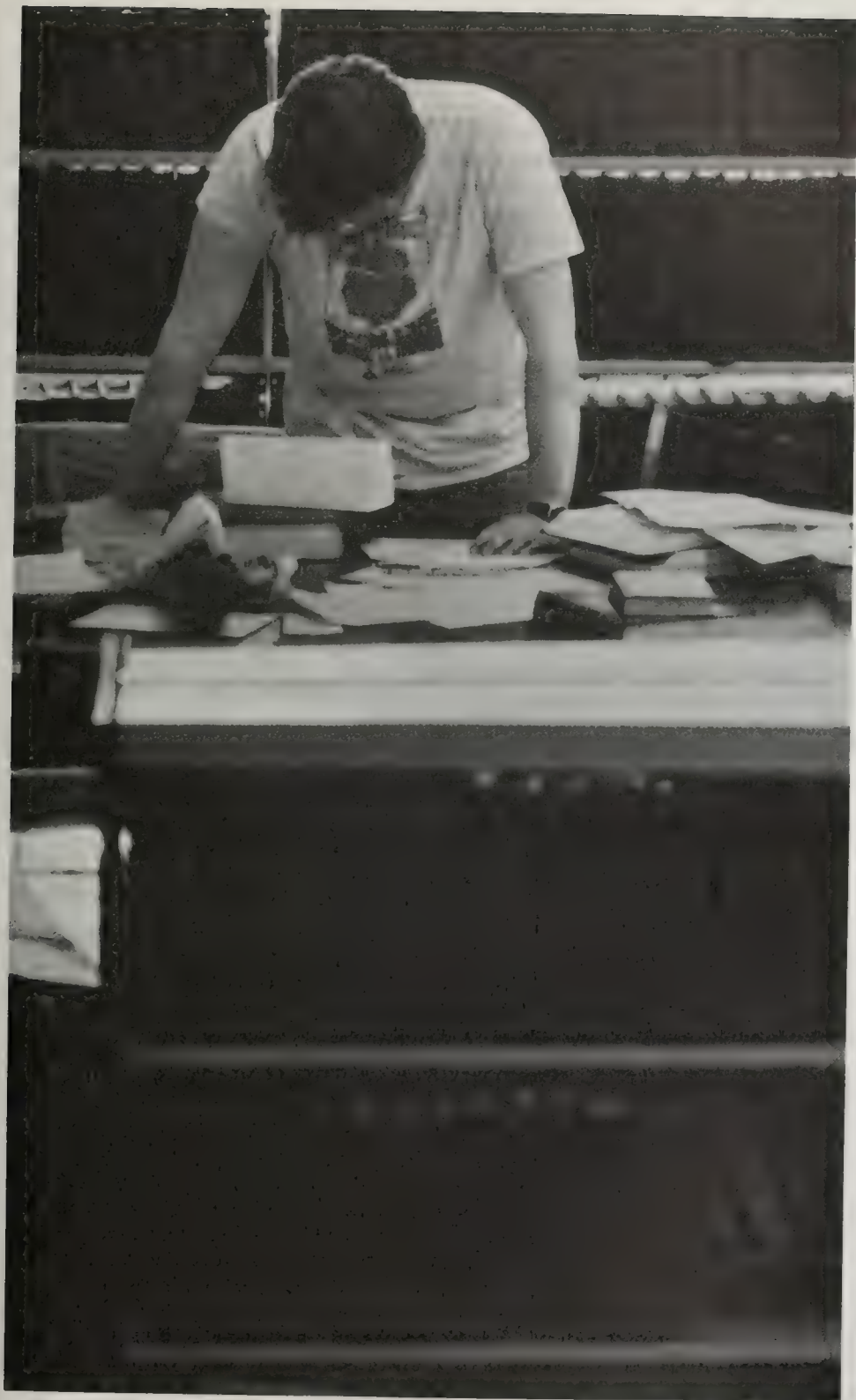
Neill Blue Memorial Scholarships were established in memory of a law student who suffered a tragic death in 1971.

John R. Parkinson Scholarships were established by the Parkinson family.

Anna Pierce Stafford Scholarships were established in honor of members of the family.

South Carolina Law Alumni Scholarships were established by South Carolina Alumni.

The Marjorie Patrick Arnold Scholarship and the Giles-Rich-Stoner Scholarship were established by Hubert K. Arnold, of the Class of 1939, in honor of his wife and sisters, respectively.



Richard M. Nixon Scholarships were established by the Class of 1937 to honor their classmate, the former President of the United States.

Upperclass Awards

The great majority of available scholarship funds are allocated to entering students and to students continuing under a scholarship contract awarded at the time of admission. However, the Law School is able to offer a limited number of awards to upperclass students who have outstanding records in law school and who demonstrate substantial need that cannot be met through other sources. Such awards are made for one year only, and carry no right of continuation; all students who apply for aid each academic year are automatically considered for these scholarships. In addition to such general endowment funds as may be available from year to year, funding for upperclass scholarships comes primarily from four sources:

David H. Siegel Scholarships were established by Allen G. Siegel, of the Class of 1960, in memory of his father.

The Miller and Chevalier Charitable Foundation Scholarship was established by a Washington, D.C. law firm.

Jenny Ferrara Scholarships were established by Vincent L. Sgroso, of the Class of 1962, in honor of his grandmother.

The Hunton and Williams Scholarship was established by the law firm of Hunton & Williams, through its Raleigh, North Carolina office.

Loan Assistance

Students who need loan funds to help finance their legal education must also submit a financial aid application at the time admission is sought. When applicants receive an offer of admission they will generally know the amount of scholarship assistance available and will be given a very tentative commitment of loan funds. However, a final determination of loan eligibility is generally not made until late spring or early summer after financial information is complete and governmental funds secure. Students requiring an earlier estimation of loan availability should consult directly with the Law School's financial aid office. The appropriate loan application and a request for any additional documentation required will be sent to the student when the student confirms his or her place in the entering class and accepts the financial aid offer.

Incoming students applying for loans administered or certified by Duke University must generally participate in the Graduate and Professional School Financial Aid Service (GAPSFAS), although students wishing to be considered only for the Federally Insured Student Loan Program may substitute a federal need analysis test. Students seeking loan assistance need not supply parental information on these forms, providing federal criteria for independent status are met. Information and application material for GAPSFAS may be obtained by writing to GAPSFAS, P. O. Box 2614, Princeton, New Jersey 08540. Forms for the next academic year are generally available in January, and should be completed and returned as soon as possible; six to eight weeks must be allowed for processing at the Princeton Center. Federal need analysis forms are available from the student's lending institution or from the Law School's financial aid office. GAPSFAS reports or completed need analysis forms should be received by the Law School no later than May 1 to avoid disadvantaging the student. Additional documentation, including income tax returns for the student and, if dependent, his parents, will be required at a later date.

At this time the following loan sources are either administered by Duke University or are available to Duke law students. Approval of any loan application is based on financial need and satisfactory scholastic standing.

National Direct Student Loan Program Loans. Loans are available to full-time Duke law students in good standing through the National Direct Student Loan (NDSL) Program, assuming the continuation of appropriations by Congress for this purpose. Interest on these loans, at a rate of 5 percent, begins to accrue six months after the student leaves the Law School, and repayment usually begins at that time. Complete repayment is scheduled over a period of up to ten years. Duke administers all NDSL loan funds allocated to it under strict federal guidelines dealing with such issues as the amount of parental income, reasonableness of budgets, complete disclosure of assets, and emancipation within the meaning of the applicable federal regulations. A GAPSFAS report is required to determine NDSL eligibility.

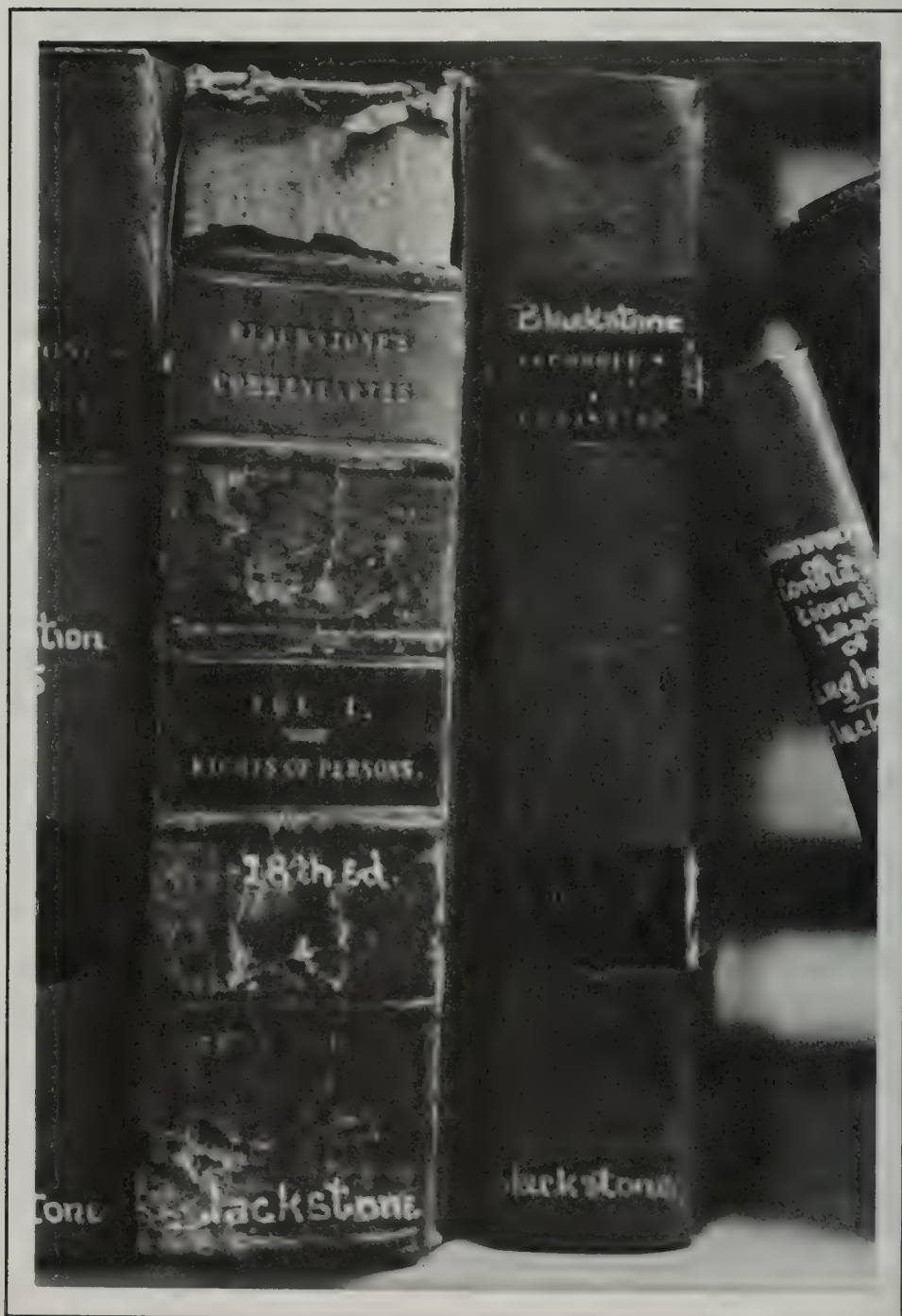
Federally Insured Student Loan Program (FISL/GSL). The future of the FISL/GSL program is uncertain, given the proposals made by the Reagan administration. At this writing the program allows a full-time student in good standing with demonstrated need according to the GAPSFAS report or a federal need analysis to borrow up to \$5,000 per year at an interest rate of between 7 and 9 percent. Interest on these loans will be paid by the government while the student is in school. As with the NDSL, a six-month grace period after graduation is permitted before repayment must begin. A student will have a maximum of ten years following graduation or withdrawal from the University to repay the loan. A student seeking a FISL/GSL is required by Duke University first to apply for necessary funding to the appropriate governmental agency in the student's home state. If this agency denies the request, a letter from the agency certifying this determination must be submitted to the Law School which will then process the loan through an alternate lender.

ALAS Loans. The ALAS program supplements other federal programs by providing additional loan funds without regard to the student's personal or family resources. Loans of up to \$3,000 per year are guaranteed by the Higher Education Assistance Foundation, and carry a current interest rate of 12 percent. Loans made under the ALAS program are not eligible for the federal interest subsidy; interest payments are made on a monthly basis while the student is in school or, in some cases, added to the principal amount of the loan. A nonrefundable guarantee fee of 1 percent per year of the total loan amount will be collected in advance from the borrower by deducting it from the loan proceeds.

Work Study

The Law School also receives a limited amount of federal work-study funds each year. The school does not recommend that first-year students work, so these funds are reserved for second- and third-year students. A few positions using work-study funding are available each summer, usually at the Law School. Students must acquire these jobs on their own, then seek funding early in the spring from the financial aid office. Students need to be aware that since work-study is a type of federal aid, they are required to save 60 or 80 percent (depending on the city where they work) of their summer work-study earnings, and these savings become a part of the next academic year's aid package. Academic year work-study is automatically allocated as a part of the student's aid if funds are available.

Scholastic Standards



Grading

The Law School utilizes a numerical system of grading based on a 4.0 scale. The normal distribution of grades for an average class reflects the fact that very little grade inflation is practiced at the Law School. In any given year grades of close to 3.0 will put students well above the median for that class. The Law School does not rank its students prior to their graduation. However, each year statistics are compiled indicating what percentage of the members of each class fall within certain ranges on the basis of their cumulative grade point averages. The following statistics represent the distribution of *second* year grade point averages for over 500 students, 1981-84.

Cumulative GPA	Average Grades Second Year
3.500-4.00	1 %
2.50-3.499	10 %
3.000-3.249	21 %
2.750-2.999	31 %
2.500-2.749	19 %
Below 2.500	18 %

Most courses are generally available only on a graded basis. Independent research, ad hoc seminars and occasionally some other courses may be designated for credit/fail grading by action of the faculty. If a student has previously taken or audited a course for at least an eight-week period, or in other special circumstances, credit/fail grading may be required or authorized in an individual case at the discretion of the instructor and the Dean.

Other Standards and Rules

Like all academic institutions, the Law School is governed by scholastic standards and rules promulgated by the faculty, which cover such matters as eligibility to continue the study of law, academic probation, minimum and maximum course loads, examinations, and registration procedures. A complete copy of these rules is available for review in the Law School library.

Curriculum



First-Year Curriculum

The following first-year courses are required of all J.D. and LL.B. candidates:

Courses	Credits
Civil Procedure	5
Constitutional Law	5
Contracts	5
Criminal Law	3
Lawyers and Clients	1
Property	5
Torts	5
Legal Writing and Advocacy	<u>2</u>
	31

Each first-year course will be divided into a combination of large, medium, and/or small sections. Each first-year student will be assigned in one of his or her courses to a small section, normally numbering not more than twenty-five, and in the balance of his or her courses to medium or large sections.

FIRST-YEAR COURSES

110. Civil Procedure. A consideration of the basic problems of civil procedure designed to acquaint students with the fundamental stages and techniques of litigation—e.g., pleading, discovery, trial, appeal, judgments, and multiparty actions—and to introduce them to underlying problems such as jurisdiction, choice of law in a federal system, and the roles of courts as law-making institutions. 5 s.h. *Carrington, Metzloff, or Paschal*

120. Constitutional Law. An examination of the distribution of and limitations upon governmental authority under the Constitution of the United States. Included are study of the doctrine of judicial review of legislative and executive action, the powers of Congress and the President, the limitations on state governmental powers resulting from the existence or exercise of congressional power, and judicial protection against the exercise of governmental power in violation of rights, liberties, privileges, or immunities conferred by the Constitution. 5 s.h. *Van Alstyne or Shane*

130. Contracts. The formation and legal operations of contracts, their assignment, their significance to third parties, and their relationship to restitution and commercial law developments; the variety, scope, and limitations on remedies; and the policies, jurisprudence, and historical development of promissory liability. 5 s.h. *Bernstein, Pratt, or Weistart*

140. Criminal Law. An introductory study of the law of crimes and the administration of criminal justice, including analysis of the criminal act and the mental element in crime, consideration of specific offenses as defined by statute and the common law, and discussion of typical defenses in relation to specific crimes. One of the purposes of the course is to introduce the students to the nature of social control mechanisms and the role of law in a civilized society. 3 s.h. *Beale or Enker*

150. Lawyers and Clients. One-week intensive course in professional responsibility. 1 s.h. *Metzloff, Oakes, Rubin, or Swinson*

160. Property. A study of the basic concepts of real property law and conveyancing, including historical background; estates in land, including the fee simple, the fee tail with its statutory substitutes, the life estate, the estate for years, and other non-freeholds; concurrent ownership; types of future interests; conveyances before and after the Statute of Uses; landlord and tenant; the modern deed—kinds, delivery, description, title covenants, and agreements running with the land at law and in equity; easements; and recording and title registration. 5 s.h. *Maxwell, Reppy, or Sparks*

170. Torts. An analysis of liability for personal injuries and injuries to property. The law of negligence occupies a central place in the course content, but the course also considers other aspects of tort liability such as strict liability, liability of producers and sellers of products, nuisance, liability for defamation and invasion of privacy, and commercial torts. The subjects of causation, damages, insurance (including automobile no-fault compensation systems), and workmen's compensation are also included. 5 s.h. *Christie, Culp, or Robertson*

190. Legal Writing and Advocacy. Following instruction in legal research, students write five to seven papers (from client letters to formal appellate briefs) under tutorial supervision of faculty member; at least one brief is argued orally. 1 s.h. fall and spring. *Culp, Haagen, Metzloff, Pratt, Pursley, Reppy, Robertson, or Rutledge*

The Upperclass Curriculum

In the absence of special authorization from the Dean, each student is required to take in each semester courses aggregating not less than twelve and not more than sixteen semester-hours in order to be considered a full-time student for purposes of meeting the residency requirement for the J.D. degree.

The program in the second and third years is entirely elective. In planning his or her program, however, the student should bear in mind that certain more basic courses may be prerequisites to other more advanced courses, and that for this reason—as well as to avoid possible schedule conflicts—it is generally advisable to take these more basic courses in the second year.

To facilitate casual examination by the prospective admissions applicant, the upperclass curriculum is divided here into the following categories: (1) American Law and the Private Sector; (2) American Legal Institutions and Procedure, (3) Family Property and Relations, (4) Foreign and International Legal Studies, and (5) Legal Theory and History. Upperclass students are free to select courses without regard for these categories. A number of courses fall clearly into at least two categories and may therefore be listed twice; others could reasonably be listed in two or more categories, but are not.

Those offerings listed as courses are open to large enrollments. Those listed as clinical are limited to enrollment in order to permit close supervision of the professional work students are required to perform. Those listed as regular seminars are also limited in enrollment; research papers are generally required. Those listed as research tutorials are limited to a very few students in number and engage the students in research projects with the instructor.

Upperclass Courses

I. AMERICAN LAW AND THE PRIVATE SECTOR

400. Admiralty. An examination of the special body of law governing maritime affairs, especially the transportation of goods and passengers by water. Included in this coverage are admiralty jurisdiction, marine insurance, carriage of goods, charter parties, general average, rights of injured seamen and others, collision, salvage, maritime liens and ship mortgages, limitations and liability, and governmental activity in shipping. 2 s.h. fall. *Paschal*

205. Antitrust. A study of the federal antitrust laws and the policy of using competition to control private economic behavior. 4 s.h. fall. *Havighurst*

583. Antitrust Practice (Clinical Course). A study of selected current antitrust problems conducted by a professor and a former chairman of the Federal Trade Commission. In addition to examining problems of current doctrinal and theoretical interest (e.g., vertical restraints, merger policy and joint ventures, standard setting and certification, implied exemptions, and professional self-regulation), the class will be given assignments of a practical (clinical) nature. Prerequisite: Antitrust. 2 s.h. spring. *Collier*

207. Athletics and the Legal Process. An examination of legal relationships in professional sports as a basis for developing concepts about the nature of the legal process. To be examined are the respective roles of private contract, collective bargaining, and private and public litigation to resolve conflicts both between players and clubs and among clubs themselves. The major concepts to be applied will be drawn from the areas of labor, antitrust, and contracts law. (Normally offered only in alternate years. Requires prior or concurrent enrollment in Labor Relations.) 2 s.h. spring. *Wiestart*

325. Bankruptcy. A study of the methods by which conflicts between the financially distressed debtor and its creditors and conflicts among its creditors may be resolved under the liquidation or rehabilitation chapters of the Bankruptcy Reform Act of 1978. Prerequisite: Commerical Law or Secured Transactions or permission of the instructor. 4 s.h. fall. *M. Shimm*

595. Bankruptcy: Chapter 11 (Seminar). This seminar will examine selected aspects of the reorganization of financially distressed debtors. 2 s.h. spring. *Shimm*

255. Basic Federal Income Taxation. An introduction to federal income taxation, with emphasis on the determination of income subject to taxation, deductions in computing taxable income, the character of the income realized, and the proper taxpayer on which to impose the tax. 4 s.h. fall. *Schmalbeck*. 4 s.h. spring. *Gann*

210. Business Associations. An examination of the state and federal law pertinent to corporations and, to a lesser extent, partnerships as business entities. Detailed attention is given to the legal ground rules for the life cycles of corporations—to their organization, preincorporation transactions, basic financial structure, internal governance arrangements, dissolution, and other fundamental changes. Further, a detailed study is made of those portions of the federal securities law that most closely affect the organic law of the corporation—federal regulation of the proxy system and of tender offers and federal restraints on inside trading and on certain other transactions in securities. 4 s.h. fall. *DeMott*. 4 s.h. spring. *Cox*

300. Business Planning (Clinical Course). Advanced work in corporation, partnership, and income tax law, securities regulation, and accounting. Attention is focused on a series of problems that commonly and currently face business lawyers in

the formation and financing of business organizations; restructuring ownership interests and financing their withdrawal; sales and purchases of businesses; and merger and other enterprise combination, enterprise division, and dissolution. The problems are analyzed, and solutions are presented in class discussion and papers by an integrated approach that embraces the interplay of restraints posed by various areas of the law. Prerequisite: Corporate Taxation (may be taken concurrently). 3 s.h. spring. *Pinna*

584. Collective Bargaining (Seminar). A comprehensive treatment of the legal and practical aspects of negotiating a collective bargaining agreement in both the public and private sectors. There is substantial student participation, together with practical demonstrations relating to arbitrations and typical bargaining problems. Prerequisite: Labor Law. 2 s.h. fall. *Siegel*

554. Commercial Arbitration (Clinical Course). A concentrated lecture presentation of the fundamentals of construction law (two hours per week for three weeks), followed by the students' preparation (four weeks) and presentation (six hours per day for two days in each of two weeks) of a construction arbitration. Two teams of up to six members each utilize the project documents of a recent case to develop practical skills in formulating the theory of the case, preparing the claims/defense manuals, demonstrative evidence and briefs, examining and cross-examining witnesses, and making opening and closing arguments. Three students act as arbitrators, conduct the hearings, rule on evidentiary matters, and render a written award. There is a "morning after" critique of each session. In addition, there is a placement for each student as a "law clerk" to an advocate or an arbitrator in an actual commercial arbitration being presented at the Private Adjudication Center. 2 s.h. fall and 2 s.h. spring. *Foster*

215. Commercial Law. An integrated study of the law governing commercial transactions and emphasizing the application of the Uniform Commercial Code, particularly the articles dealing with commercial paper, bank deposits and collections, and secured transactions. Topics that are given particular attention include the function and incidents of common forms of negotiable instruments, the mechanics of the bank collection process, and the operation of retail credit systems. 4 s.h. fall. *Wiestart*. 4 s.h. spring. *Shimm*

569. Commercial Practice (Clinical Course). A study of the professional tasks involved in the resolution of commercial disputes. Students are divided into small simulated law firms, each working under the supervision of a senior fellow who is a partner in a major law firm. Each firm receives a portfolio of problems to be handled throughout the year. The assigned tasks for each problem include legal analysis of the client's position, advice to the client, settlement negotiations with adversary counsel, preparation of briefs, and oral argument before a judge. The problems are prepared, and the work of the student firms largely evaluated, by external examiners who are associates in other major law firms. Enrollment is limited to thirty-six students and is subject to approval of the course administrator. 2 s.h. fall and spring. *Pursley and staff*

220. Construction Law. An interdisciplinary approach to the engineering (design), business, and legal aspects of construction problems, with students from both the engineering and business schools. The course examines these recurring relationships through class lectures and discussions of ten actual problems derived from the instructor's experience as a construction arbitrator and advocate. Participants are occasionally divided into teams who consider the problem cases, develop theories of presentation and evidentiary support, and attempt to resolve the problems variously through negotiation, mediation, arbitration, and litigation. Law students who have taken the course may enroll in the spring clinical seminar and placement in Commercial Arbitration. 2 s.h. fall. *Foster*

315. Corporate Finance. A consideration of the role and impact of financial analysis in the application and development of legal norms in connection with recurring corporate transactions. Coverage includes an investigation of the financial considerations arising in connection with valuation of a business corporation, rearrangement of the rights of creditors and stockholders in bankruptcy, establishment of dividend and reinvestment policies of publicly traded corporations, and measurement of the fairness and success of corporate acquisitions. 2 s.h. fall. *DeMott*

320. Corporate Taxation. A study of the special provisions of the Internal Revenue Code concerning the tax effects of the major events that occur in the life span of a corporation, including the taxation of distributions to shareholders and the formation, reorganization, and liquidation of corporations. Prerequisite: Basic Federal Income Taxation. 3 s.h. spring. *Schmalbeck*

589. Economic Analysis of Patent Law (Seminar). The seminar will draw upon concepts from microeconomic theory to explore policy issues relevant to the design and implementation of an efficient patent system. A substantial portion of the seminar will be devoted to an examination of the conflict between antitrust law and patent law concerning the terms of patent licenses. Other topics to be studied include: the litigation and settlement of infringement suits, a comparison of trade secret law with patent law, and the scope of the disclosure requirement attendant to the patent grant. Our inquiry will emphasize consideration of the effect of patent institutions on the incentive to undertake research and development, and the costs to society of providing that incentive.

The necessary economic theory will be developed in the seminar, but a background in economics would certainly be helpful. Prerequisites: Antitrust law or intellectual property law, joint degree program in law and economics, or permission of the instructor. 3 s.h. spring. *Meurer*

517. Employment Discrimination. A study of the law of employment discrimination, focusing mainly on federal law prohibiting race, sex, age, and handicapped discrimination. The course provides a basic knowledge of statutory coverage, standards, procedures and proof, and avenues of relief. Class discussion emphasizes important issues arising in current cases: for example, reverse discrimination versus affirmative action, the controversial "comparable worth" concept in equal pay litigation, and the "bottom line" defense to test invalidation. 2 s.h. fall. *L. Larson*

326. Entertainment Law: Motion Picture Production (Clinical Course). A study of the legal, financial, and business considerations of film industry practice. Emphasis will be placed on independent production, although studio financing and coproduction ventures will be examined and contrasted. Each aspect of the production process, from formulation of the initial concept to exhibition and ancillary rights development, will be analyzed in light of the lawyer's role in supporting producers' coordination of creative talent and commercial interests. 2 s.h. fall. Prerequisite: Entertainment Law 1 or permission of instructor. *Lange and Frey*

327. Environmental Law. A study of major policy and legal issues raised by efforts to manage environmental harms and pressure ecological systems. Emphasis in the course is on recurring themes and conflicts, and on the economic, social, ecological, and political assumptions that underlie the different responses that have been proposed. (Not offered 1985-86.)

518. Federal Tax Policy (Seminar). Structure, incidence, and economic effects of major federal taxes. Special attention to problems of inflation, income definition, and distortions of economic incentives in the areas of savings and investment. There are no fixed prerequisites, but prior or concurrent exposure to other tax courses

(especially Basic Federal Income Taxation) and/or microeconomics and statistics courses would be helpful. Preference given to third-year students. 3 s.h. fall. *Schmalbeck*

250. Financial Information, Accounting, and the Law. An examination and analysis of accounting principles and practices as they interface with a variety of legal problems. The course materials also present a wealth of information arising from empirical studies of stock price behavior in response to financial information. Contemporary reporting problems such as the regulation of financial forecasts, accounting for the gains and losses arising from inflation, the role of financial information in predicting business failure, and the information needs of investors in an efficient market are singled out for special consideration, along with the more orthodox coverage of the fundamentals of accounting theory and practice. 2 s.h. fall. *Etheridge*

337. Health Care Law and Policy. A survey of the legal environment of the health services industry in a policy perspective, with particular attention to the tensions and trade-offs between quality and cost concerns. Topics for study include manpower policy and licensure; private personnel credentialing and institutional accreditation; hospital staff privileges; malpractice liability; health planning and certificate-of-need regulation; hospital reimbursement and rate setting; public and private methods of rationing medical care; health insurance and alternative financing and delivery systems; and the emerging role of competition and antitrust law. The course should be of interest to students interested in public policy and in law and economics as well as those with specific interests in the health care field. 3 s.h. spring. *Havighurst*

229. Insurance Law. An examination of the nature of insurance and the insurance contract. Possible topics include: the role of risk classification, marketing, the principle of indemnity and the notion of an insurable interest, subrogation, the risks transferred, rights at variance with policy provisions, claims processes, and justifications for and the nature of regulation of insurance institutions. 2 s.h. fall. *Bernstein*

357. Intellectual Property I: Law and the Arts. An introduction to the principal theories of intellectual property in the fine arts and in the entertainment and sports industries. Includes comprehensive instruction in copyright, unfair competition, and the right of publicity, as well as selective coverage of other doctrines. (Not offered 1985-86.)

367. Intellectual Property II: Business Intellectual Property. An introduction to trademark and patent law licensing and the law of trade secrets, as well as selective coverage of other subjects in conventional business and industrial settings. Prerequisite: concurrent enrollment in Intellectual Property I. Not offered 1985-86.

607. Intellectual Property III (Tutorial). Research and writing on selected topics in intellectual property. Limited availability; permission of the instructor required. 3-6 s.h. fall and spring. *Lange*

240. Labor Relations. A study of the law of labor-management relations, centering upon the National Labor Relations Act, as amended. The course investigates problems involved in the regulation of industrial conflict (strikes, picketing, boycotts, and unfair labor practices by employers), the establishment of the collective bargaining relationship, the negotiation and enforcement of the collective agreement, the arbitration of disputes under the agreement, the relationship between the union and its members, and the protection of individual and minority rights. 3 s.h. fall. *Horowitz*

608. Labor Relations (Tutorial). Directed research in advanced labor problems. Topics may include: the fit between legal rules and workplace conditions, the aptness of National Labor Relations Board procedures, the relations between rights afforded by collective agreements and those guaranteed by law, and the implications of the division between unionized and nonunionized sectors. Prerequisite: strong background in labor law and consent of the instructor. 3-6 s.h. fall. *Horowitz*

355. Land Use Planning. A survey of legislative, administrative, and judicial controls utilized to facilitate the orderly development and redevelopment of real property. This consideration includes public and private nuisance, zoning, subdivision control, housing codes, street mapping, and condemnation. The clash of individual and societal interests in land use is explored through cases involving the distinction between valid police power regulations and "takings" for public use that require payment of compensation. Problems of urban renewal, regional planning, and pollution of water and air also receive consideration. 3 s.h. spring. *Babcock*

544. Land Use Planning II (Seminar). This course may only be taken concurrently with 355. An in-depth study of select jurisdictions to determine the impact of various legal issues in land use planning on communities in those jurisdictions, including the "taking issue"—section 1983; the Central Business District and the Sherman Act; the impact of changing demography in the last thirty years on local zoning policies; the acceptance or rejection of the halfway house; and the attitude of communities toward "time sharing." 2 s.h. spring. *Babcock*

632. Managerial Behavior (Tutorial). The tutorial will explore the theme of whether managerial misconduct is better addressed *ex ante* through prophylactic procedures (rules) or *ex post* by generalized norms (standards). Students will be directed in their conduct of original research into specific areas of managerial conduct in which the choice between rules and standards is most clearly presented. Areas include going private transactions, corporate defensive maneuvers, insider trading, violations of criminal statutes, "Greenmail," conflict of interest transactions (sometimes referred to as "interested director" problems), and corporate opportunities and competition with corporation. 3-6 s.h. fall and spring. *Cox*

396. Oil and Gas. A study of the law governing the recognition and protection of property interests in oil and gas in natural reservoirs and an analysis of the transactions, particularly the oil and gas lease, by which the right to produce oil and gas is purchased. Although the course is focused on the private law problems of landowners and firms interested in mineral development, the legal problems and policy implications of government intervention for conservation and for economic regulation are considered. 3 s.h. spring. *Maxwell*

411. Partnership Taxation. A study of the special provisions of the Internal Revenue Code (principally those in Subchapter K) relating to the tax consequences of doing business as a partnership. Consideration includes organization and dissolution of the partnership, distributions from the partnership to the partners, and the pass-through of certain tax attributes from the partnership to the partners. 3 s.h. spring. *Pennell*

593. Professional Liability (Seminar). The past fifteen years have seen a significant increase in the number, as well as the complexity, of claims asserted against professionals. The potential liability of attorneys, accountants, doctors, architects, and other "professionals" is a matter of great importance given the significant resources expended in providing professional services. This course will analyse several major issues in this field including the interaction of professional liability with (1) regulatory and disciplinary proceedings, (2) marketing efforts by the professional, and (3) the advent of specialization in the profession. It will also focus on specific liability principles controlling the accounting, legal, and medical professions. 2 s.h. spring. *Metzloff*

365. Real Estate Financing. An examination of the law governing transactions in which land is used as security for a debt. The course will focus on the law of a single jurisdiction to allow students to work with the subject in a systematic and realistic fashion. Although most of the materials used will come from the legal system

of California, reading assignments will also be made in a general textbook. Prerequisite: Commercial Law. 3 s.h. spring. *Maxwell*

370. Regulated Industries. A study of government economic regulation and deregulation in such regulated industries as transportation, electric power, telephone, broadcasting, oil and gas, and health care, with emphasis on control of entry, mergers, and rates, and on the interface between regulation and the antitrust laws. 3 s.h. spring. *Havighurst*

375. Securities Regulation. A study of the federal and state securities laws and the industry they govern with emphasis on the regulation of the distribution process and trading in securities; subjects dealt with include the functions of the Securities and Exchange Commission, registration and disclosure requirements and related civil liabilities, "blue-sky" laws, proxy solicitation and reporting requirements, broker-dealer regulation, the self-regulatory functions of the exchanges, and the regulation of investment companies. 3 s.h. spring. *Cox*

641. Sex Discrimination (Tutorial). A three-hour research tutorial offered to two students in the spring semester. Students will participate in the legal analysis of the problem of discrimination based on sexual favors and relations. 3 s.h. spring. *Chamallas*

II. AMERICAN LEGAL INSTITUTIONS AND PROCEDURE

200. Administrative Law. A study of administrative agencies and legislative authority, information gathering and withholding, rule-making and order-formulating proceedings, judicial review of administrative action, and constitutional limitations on administrative powers. 3 s.h. spring. *Baxter*

310. Conflict of Laws. A study of the special problems that arise when the significant facts of a case are connected with more than one jurisdiction, including recognition and effect of foreign judgments, choice of law, federal courts and conflict of laws, and the United States Constitution and conflict of laws. 3 s.h. spring. *Reppy*

550. Constitutional History. A three-part course, the first part is devoted to the Constitutional Convention of 1787 and the surrounding events. The second part focuses on the institutions of slavery and the law before and after the Civil War. The third part focuses on the New Deal and its relations with the Supreme Court. 2 s.h. fall, 1 s.h. spring. *Dellinger, Leuchtenburg, and Franklin*

380.1. Civil/Criminal Trial Practice (Clinical Course). An introduction to the civil and criminal litigation process and attendant skills. The course emphasizes the interactions between attorneys and their clients and between lawyers and juries by use of simulation and videotape pedagogy. Areas of inquiry include trial preparation, opening statements, closing arguments, evidentiary objections, and direct- and cross-examination of lay and expert witnesses. Each student completes the course requirements by participating as counsel in a full jury trial. Prerequisite: Evidence. 3 s.h. fall. *Beskind*

380.2, 3 and 4. Civil/Criminal Trial Practice (Clinical Course). An introduction to the trial process through the criminal trial and development of attendant skills. The course emphasizes the interactions between lawyers and judges and juries by use of simulation exercises and videotape review. The traditional areas of inquiry in trial practice will be covered in this course through the vehicle of the criminal trial process. They include trial preparation, jury selection, opening statements, evidentiary objections, and direct and cross-examination. In addition, substantive materials from Criminal Procedure: Police will be treated through litigation of motions to suppress tangible evidence, statements, and identification under the Fourth and

Fifth Amendments. In this portion of the course, students will be expected to analyze facts, write motions and legal memoranda, and litigate suppression hearings. Trial tactics and strategy will be carefully examined. The course culminates in a full jury trial with each student participating as counsel. Prerequisite: Evidence. 3 s.h. spring. *Becton, Hutchinson, and Swinson*

521. Criminal Litigation (Clinical Course). An examination of the lawyering process in criminal cases from the point of view of the criminal justice practitioner. Using videotape simulation, students will participate as attorneys in simulations of various stages of criminal justice process from initial interview through trial, with special emphasis on pretrial proceedings. The clinical phase of the seminar requires each student to practice with criminal justice practitioners pursuant to the North Carolina Rules Governing Practical Training of Law Students. Placements include district attorneys, the public defender, and private defense counsel. Prerequisites: Criminal Procedure: Police; Evidence; and Trial Practice. 4 s.h. fall. *Mosteller*

223. Criminal Procedure: Formal. A study of the basic rules of criminal procedure, beginning with the institution of formal proceedings. Subjects to be covered include prosecutorial discretion, the preliminary hearing, the grand jury, criminal discovery, guilty pleas and plea bargaining, jury selection, pretrial publicity, double jeopardy, the right to counsel, and professional ethics in criminal cases. 3 s.h. spring. *Beale*

222. Criminal Procedure: Police. A study of the legal restrictions on police investigative practice which typically proceeds the institution of formal proceedings, with special emphasis upon "stop and frisk," arrest, search and seizure, confession suppression, lineups, electronic surveillance, and operation of the exclusionary rule. 2 s.h. fall. *Everett*; or 2 s.h. spring. *Pye*

385. Criminal Trial Practice (Clinical Course). An introduction to the trial process through the criminal trial and development of attendant skills. The course emphasizes the interactions between lawyers and judges and juries by use of simulation exercises and videotape review. The traditional areas of inquiry in trial practice will be covered in this course through the vehicle of the criminal trial process. They include trial preparation, jury selection, opening statements, evidentiary objections, and direct and cross-examination. In addition, substantive materials from Criminal Procedure: Police will be treated through litigation of motions to suppress tangible evidence, statements, and identification under the Fourth and Fifth Amendments. In this portion of the course, students will be expected to conduct investigation, analyze facts, write motions and legal memoranda, and litigate suppression hearings. Trial tactics and strategy will be carefully examined. The course culminates in a full jury trial with each student participating as counsel. Prerequisites: Evidence and Criminal Procedure: Police. 4 s.h. fall. *Mosteller*

225. Evidence. A study of the theory and rules governing the presentation of evidence to a judicial tribunal, including the function of the judge and jury; the concept of relevancy; character evidence; judicial notice; real and demonstrative evidence; authentication of writings; the best evidence rule; competency, impeachment, and rehabilitation of witnesses; hearsay and the exceptions to its exclusion; and privileged communications. 3 s.h. fall. *Pye*; or 3 s.h. spring. *Enker*

555. Federal Appellate Practice-A (Clinical Course). This course includes study of appellate jurisdiction in the federal courts and instruction in oral advocacy and brief writing. Students argue a difficult appeal to an experienced judge. Students who excel are selected for the Moot Court Board, competition for the Dean's Cup, and interscholastic competition in appellate advocacy. 2 s.h. fall. *Friedman, Phillips, and staff*

500. Federal Civil Rights (Seminar). A study of advanced constitutional law and federal practice, working through a series of problems to provide: (a) familiarity with the principal federal statutes (procedural, substantive, and remedial) used in civil rights litigation; (b) their judicial interpretation and application; and (c) a consideration of frontier constitutional issues. 3 s.h. spring. *Van Alstyne*

340. Federal Courts. A study of the many ways in which federalism affects the workings of the federal courts and their relations with other branches and the states. The course covers the jurisdiction of the federal courts, original and appellate—the constitutional scope of Article III, justiciability, Congressional authority to define and limit, federal question and diversity jurisdiction, removal, pendent and ancillary jurisdiction, and abstention; some aspects of the law applicable in federal court—*Erie*, and civil rights actions and immunities; and judgments—direct review of state and federal decisions, federal-state *res judicata*, and collateral attack via habeas corpus. 3 s.h. spring. *Rowe*

568. Federal Appellate Practice-B (Clinical Course). A study of select problems and issues concerning the appellate process in the federal court system. The course is designed to provide a significant clinical experience in appellate advocacy, and the opportunity to work on an applied research and writing project, along with traditional in-class lectures and discussions. Constitutional Law is a prerequisite. Students taking the course will also find it helpful to have taken Administrative Law.

The class will cover a number of related topics, focusing principally on the work of the U.S. Courts of Appeal and (to a lesser degree) the U.S. Supreme Court. Substantive coverage will include: “jurisdictional” issues of particular interest at the appellate level; final orders and interlocutory appeals; “standing” and “ripeness” issues; prudential considerations militating against appellate review; waiver of appealable issues; the proper scope and standard of review (with emphasis on administrative agency appeals); and the remedial authority of the courts. In addition, the course will deal with certain practical problems of advocacy and judicial administration (such as: when and what to appeal, preparation of appellate briefs, oral advocacy, dispute settlement techniques, decision-making processes, and special institutional problems facing appellate judges).

There will be no final examination; however, each student will be assigned to write a brief and argue one federal appellate case and to judge another such case. In addition, each student will be required to complete a paper of limited length dealing with some important aspect of the federal appellate process.

The class normally will meet for two hours, once a week at a fixed time. There will be occasions, however, when classes are rescheduled (to meet on two consecutive days) to take account of Judge Edwards’ judicial schedule and to allow adequate time for students’ oral arguments. 3 s.h. fall. *Edwards*

343. Federal Criminal Law. This course deals with the enforcement of federal criminal statutes including those relating to tax fraud, mail fraud, civil rights, drug enforcement, the Hobbs Act, the Travel Act, and the Racketeer-Influenced and Corrupt Organizations (RICO) Act. The limits on federal criminal jurisdiction and legal issues arising out of the overlap of federal and state law will also be examined. 3 s.h. fall. *Beale*

561. Forensic Psychiatry (Clinical Course). This course is designed to provide the student with a working knowledge of the major areas of interface between psychiatry and law. Basic concepts of clinical psychiatry and psychopathology will be highlighted throughout the course. The attorney and the psychiatrist roles in the commitment process, right to treatment and right to refuse treatment, competency to stand trial, and criminal responsibility will be explored using a number of methods. Discussion of assigned readings, short lectures, interviews and observation of pa-

tients involved in legal proceedings, films, guest speakers, and field trips will form the basis of the course. The students will periodically be asked to use the information from the course together with independent and group research to complete short projects and class exercises. 3 s.h. spring. *Johnson*

558. Habeas Corpus and Criminal Appeals (Clinical Course). Examination of post-conviction remedies in the Fourth Circuit; preparation of an appellate brief for a state or federal case; analysis of habeas petitions pending in federal district courts and participation in habeas cases which proceed to plenary hearings; drafting of an opinion in a federal habeas case. Enrollment limited to eight students. 2 s.h. spring. *Rutledge*

534. Judicial Administration and Politics (Seminar). Examination of the judicial function in relation to historical and contemporary politics of court organization, management, and procedures as well as of selection and discipline. Focus is on American federal judicial system with references to state and comparative aspects of adjudication-administration. Two required ten-page papers or weekly assigned reserve readings are due for seminar meeting devoted to discussion of those readings. With permission of the instructor a student may write an additional paper of substantial length on course subject matter, and will receive 3 s.h. credit. 2 or 3 s.h. spring. *P. Fish*

552. Religion and Law (Seminar). Interdisciplinary investigation of the impact of first amendment doctrine on religious organizations; the legal rights and moral obligations of clergy in questions involving the application of the testimonial privilege based on the priest-penitent relationship; state regulation of cult groups; attempts by religious groups to counter the secularization of law in areas such as abortion, sexual preference, and censorship; comparison of the concepts "punishment" and "sin." Readings will include case law, statutes, and writings by legal and religious commentators. Additionally, teams of students will study one topic in depth and make an oral presentation to the class. There is no final examination. 2 s.h. (Not offered in 1985-86.)

540. Legislation (Seminar). A study of the factors involved in the development and passage of legislation, and in its interpretation by the courts. Topics covered include theories of legislation, legislative procedure and process, problems in drafting statutes, compilation of legislative histories, and determination of legislative intent. A research paper is required. 2 s.h. spring. *Danner*

571. Negotiation and Settlement (Clinical Course). An examination of the lawyer's role as a negotiator in seeking to resolve legal disputes without resort to full adjudication. The course focuses on techniques, tactics, ethics, and other aspects of the negotiation process. Students are divided into teams which compete with each other in seeking to negotiate settlements in a series of simulated disputes involving such matters as commercial transactions, personal injury claims, real estate transactions, antitrust litigation, and labor relations. Enrollment limited to twenty-four. 2 s.h. spring. *Hutchinson*

332. Remedies. A survey of the law of judicial remedies in civil litigation, with illustrative applications in various areas of private and public substantive law. The course covers the main types of remedies—compensatory and punitive damages, equitable relief including injunctions and specific performance, declaratory judgments, and restitution, considering both their basic characteristics and their interrelations. Illustrative applications are drawn primarily from the substantive fields of tort (injury to persons and to personal and real property), contract, and civil rights. Normally offered in alternate years. 2 s.h. spring. *Rowe*

592. Selective Problems in American Law and Society 1690-1972 (Seminar). The seminar will explore four topics: the criminal law of slavery; law and economic development, emergence of the negligence principle; child custody and adoption in the nineteenth century; and the desegregation of Central High School, Little Rock, Arkansas. Paper option. 2 s.h. spring. *Haagen*

601. (Bus. 491.x). Statistics in Business Litigation (Seminar). Reading and discussion of books, papers, and court opinions concerned with the use of statistical methods of inference in corporate litigation. Areas of litigation include employment discrimination, antitrust, product liability, health and safety, jury selection, and rate setting. The emphasis will be on the proper use of statistical methods in various situations, and the strengths and weaknesses of various techniques. Understanding of statistical ideas, rather than mathematical rigor or numerical proficiency, is a course objective. Familiarity with statistical ideas or solid grounding in college algebra is prerequisite. 3 s.h. (Not offered 1985-86.)

III. FAMILY PROPERTY AND RELATIONS

536. Child Advocacy (Clinical Course). A two-semester practicum in child advocacy. Students will be assigned to represent children in abuse and neglect cases in Durham County, under the supervision of members of the Durham bar and the course instructor, pursuant to the North Carolina Rules Governing the Practical Training of Law Students. Students will gain experience in interviewing, counseling, negotiation, case planning, trial practice, motion practice, and some discovery. In addition to work on actual cases, students will participate in a classroom seminar, in which the practical and ethical considerations involved in representing children will be explored. Medical doctors, social workers, psychologists, judges, and attorneys will participate in the seminar sessions. Simulated exercises will be used to sharpen advocacy skills. Students must also enroll in the Seminar on Children and the Law. Must be taking or have taken Family Law and Trial Practice. Must also be a third-year student in good academic standing. Class limited to nine students. 2 s.h. fall and 2 s.h. spring. *Pursley and staff*

533. Children and the Law (Seminar.) This seminar will allow students to study the relationship of children, families, and the state and arrange differently for contexts. The primary interest in the course will be upon supervised student research, which will be presented in class seminars and in a paper. Students will have considerable flexibility in choosing research topics, including work in the areas of juvenile delinquency, child welfare, termination of parental rights, adoption, parental custody disputes, medical treatment issues, or commitment of children to mental health facilities. Students may choose to do comparative work involving the United States, Canada, Great Britain, or other jurisdictions, but this is not a requirement of the course. Pre- or co-requisite: Family Law. 2 s.h. fall. *Bala*

218. Community Property. A survey of the marital property laws of Arizona, California, Idaho, Louisiana, Nevada, New Mexico, Texas, Washington, and Wisconsin, with comparison to the Spanish system. Students may concentrate their studies on the law of one of the nine states. 2 s.h. spring. *Reppy*

330. Estate and Gift Taxation. A study of the rules governing federal taxation of gifts, trusts, and estates, focusing primarily on the taxation of wealth transfers, but also including consideration of selected federal income tax laws relating to trusts. Prerequisite: Basic Federal Income Taxation (may be taken concurrently). A prior or concurrent enrollment in Trusts and Wills is recommended. 3 s.h. fall. *Adams*

515. Estate Planning (Clinical Course). An examination of the problems and techniques of estate planning and administration, including the income taxation of

trusts and estates. Students prepare planning recommendations and draft related documents for hypothetical clients. Prerequisites: Estate and Gift Taxation and Trusts and Wills; students taking Future Interests as well will be given preference in enrollment. 3 s.h. spring. *McCaughan*

335. Family Law. A study of legal issues relating to the family, including marriage, unmarried cohabitation, divorce, procreation and abortion, child custody, and the relationship between parent, child, and state. 3 s.h. fall. *Bala*

265. Future Interests. An examination of the following considerations in non-commercial property dispositions: class gifts and other issues in will construction; powers of appointment; classification of future interests; and rules against perpetuities, accumulations, and restraints on alienation. 3 s.h. spring. *Sparks*

270. Trusts and Wills. An examination of noncommercial property dispositions, both testamentary and *inter vivos*, including the following topics: the estate system, intestate succession, execution and revocation of wills, creation of trusts, ademption and lapse, integration of dispositive schemes, charitable trusts, resulting and constructive trusts, remedies for wrongful interference with succession and transfer, and problems in trust administration. 3 s.h. fall. *Adams*; or 3 s.h. spring. *Sparks*

IV. FOREIGN AND INTERNATIONAL LAW

290. American Law and Legal Research for International Students (Seminar). This course consists of two components conducted simultaneously. The first is a series of lectures by members of the Law School faculty on various aspects of the legal system of the United States and may include required readings. The second is in the form of a research and writing tutorial designed to introduce international students to the techniques of case and statutory analysis as well as the tools and methods of legal research. Students are expected to complete written assignments and memoranda of law. 2 s.h. fall. *Germain and Luney*

591. Anglo-American Legal History: Criminal Law (Seminar). This seminar will examine the development of several crimes in the common law societies of England and America from the Middle Ages to the present. The work will be both historical and comparative; works on legal philosophy will also be examined. The class work for this seminar will be the same as that for History 196S; credit may not be obtained for both courses. In addition to the class work, law students will be required to write a paper of professional quality on the evolution of a particular crime. Limited to six law students. 3 s.h. spring. *Herrup*

513. Chinese Legal History (Seminar). This course surveys Chinese legal thought and practice from traditional to contemporary law, with an emphasis on the latter. Particular attention is focused on the relation of law to social ideals, to social change, and to politics. Materials include cases, codes, and legal fiction. Prior familiarity with Chinese history or politics is unnecessary. 3 s.h. spring. *Ocko*

366. Comparative Criminal Law: The Jewish Tradition (Seminar). This seminar will examine self defense, necessity, and duress in the law of murder. Students will examine Talmudic sources as elaborated and interpreted in the Codes and applied in Holocaust responsa. 2 s.h. spring. *Enker*

305. Comparative Law: Western Legal Traditions. A study of civil law, common law, and socialist law, focusing on legal institutions, legal actors, their roles and backgrounds. The course will examine the shared Western legal and intellectual heritage and analyse selected problem areas. 3 s.h. fall. *Bernstein*

572. Comparative Public Law and Policy: Ethnic Group Relations (Seminar). An interdisciplinary seminar to appraise various approaches to the reduction of

conflict in deeply-divided societies, primarily in Asia and Africa. Substantial attention will be paid first to the nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Consideration will be given to methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. Approaches considered include federalism, regional autonomy, electoral law, parliamentary and presidential arrangements, and programs to prefer under-represented ethnic groups in education, employment, and other spheres of economic activity. Emphasis will be placed on forecasting and evaluating the impact of alternative approaches. 3 s.h. fall. *Horowitz*

345. International Business Transactions. This course examines various topics related to the conduct of international business. Subjects covered are international private trade, including private international contracts, dispute resolution, and letters of credit; the extraterritorial reach of the antitrust and securities laws; national and international regulation of trade in goods, including GATT; and international regulation of monetary affairs through the IMF 3 s.h. spring. *Gann*

590. Legal Implications of the Control of Terrorism (Seminar). This seminar will explore implications under domestic and international law arising from efforts to control terrorism. Special attention will be devoted to the problem of defining terrorism; the use of military forces; the status of terrorists under international law; domestic limitations upon gathering of strategic intelligence; efforts to deal with terrorists through treaties and the United Nations. Prerequisites: Criminal Procedure-Police and International Law. 2 s.h. spring. *Pye*

230. International Law. An introduction to the public international law of peace, including the nature and sources of international law; its place in national and international decision making; the roles of international organizations, states, and individuals in the international legal system; bases and limitations of jurisdiction; the utilization and interpretation of treaties and other international agreements; and some aspects of the regulation of economic activity within the international system. 3 s.h. fall. *Robertson*

232. International Organizations. An examination of the legal issues involved in the structure, functions, and operations of the United Nations and other international organizations within the international system. 2 s.h. fall. *Robertson*

557. International Taxation (Seminar). An examination of the federal income tax imposed on income earned in foreign countries either by citizens and residents of the United States or by foreign corporations that are controlled by citizens and residents of the United States. The course also includes a study of the federal income tax imposed on nonresident aliens and foreign corporations on their income derived from United States sources. Prerequisites: Personal Income Taxation, Corporate Taxation (may be taken concurrently), or permission of the instructor. 2 s.h. spring. *Gann*

609. Japanese Administrative Law (Tutorial). A study of Japanese administrative agencies, their legislative authority and their role in formulating and carrying out national policy. The course will examine the legal principles that govern the administrative process and judicial review of administrative actions. 2 s.h. spring. *Luney*

565. Japanese Constitutional Law (Seminar). Introduction to the basic institutions and procedures of the Japanese legal system. The course will examine the historical development of Japanese legal institutions and the distribution of and limitations upon governmental authority under the constitution of Japan. 2 s.h. fall. *Fujikura*

235. Jurisprudence. A historical examination of the development of legal philosophy from ancient times to the contemporary period. 3 s.h. fall. *Christie*

640. Law and National Defense. A study of military jurisdiction; martial law; law of war; civil court review of military actions; power of commanders over military installations; status of forces agreements; operations law; antiterrorist measures and legislative process. 2 s.h. spring. *Everett*

620. Law of the Sea (Seminar). An examination of the legal problems resulting from uses of the seas and the efforts made toward resolution of those problems. The seminar's focus is on the jurisdictional problems created by the competing claims of nation-states to competence as to the territorial sea, the continental shelf, the contiguous zone, economic zones, and the seabed. These claims are examined in the context of specific uses of the seas, including navigation, military, fishing, extraction of minerals, and scientific research. Prerequisite: International Law (may be taken concurrently). 2 s.h. (Not offered 1985-86.)

516. Political Philosophy and Law (Seminar). Primary attention will be given to contemporary jurisprudence in Europe as seen through the work of Habermas. An introduction to continental political and judicial theory will be provided. The relation of contemporary thought to earlier Marxism will be explored. The seminar will not meet until the week of September 16 and will meet twice weekly for the six weeks thereafter. A paper on an assigned topic will be the basis for the grade. There are no prerequisites. The seminar should be of special interest to students in the International Studies or Philosophy joint degree programs. Limited to 12 students. 2 s.h. fall. *Haarscher*

V. LEGAL THEORY AND HISTORY

415. American Legal History. A study of the development of fundamental American legal institutions and principles, with emphasis upon the relationships between changes in the law and other changes in American life. There will be an examination at the end of the course. 3 s.h. spring. *Pratt*

513. Chinese Legal History (Seminar). This course surveys Chinese legal thought and practice from traditional to contemporary law, with an emphasis on the latter. Particular attention is focused on the relation of law to social ideals, to social change, and to politics. Materials include cases, codes, and legal fiction. Prior familiarity with Chinese history or politics is unnecessary. 3 s.h. spring. *Ocko*

366. Comparative Criminal Law: The Jewish Tradition (Seminar). This seminar will examine self defense, necessity, and duress in the law of murder. Students will examine Talmudic sources as elaborated and interpreted in the codes and applied in Holocaust responsa. 2 s.h. spring. *Enker*

305. Comparative Law: Western Legal Traditions. A study of civil law, common law, and socialist law, focusing on legal institutions, legal actors, their roles and backgrounds. The course will examine the shared Western legal and intellectual heritage and analyse selected problem areas. 3 s.h. fall. *Bernstein*

572. Comparative Public Law and Policy: Ethnic Group Relations (Seminar). An interdisciplinary seminar to appraise various approaches to the reduction of conflict in deeply-divided societies, primarily in Asia and Africa. Substantial attention will be paid first to the nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Consideration will be given to methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. Approaches considered include federalism, regional autonomy, electoral law, parliamentary and presidential arrangements, and programs to prefer under-represented ethnic groups in education, employment, and other spheres of economic activity. Emphasis will be placed on forecasting and evaluating the impact of alternative approaches. 3 s.h. fall. *Horowitz*

550. Constitutional History. A three-part course, the first part is devoted to the Constitutional Convention of 1787 and the surrounding events. The second part focuses on the institutions of slavery and the law before and after the Civil War. The third part focuses on the New Deal and its relations with the Supreme Court. 2 s.h. fall, 1 s.h. spring. *Dellinger, Leuchtenburg, and Franklin*

359. Economic Analysis of Legal Issues. An exploration of diverse topics in law and economics such as property rights and externalities, tort law and optimal accident prevention, bargaining and game theory, the economics of contracts, and theories of economic justice. 3 s.h. (Not offered 1985-86.)

591. Anglo-American Legal History: Criminal Law (Seminar). This seminar will examine the development of several crimes in the common law societies of England and America from the Middle Ages to the present. The work will be both historical and comparative; works on legal philosophy will also be examined. The class work for this seminar will be the same as that for History 196S; credit may not be obtained for both courses. In addition to the class work, law students will be required to write a paper of professional quality on the evolution of a particular crime. Limited to six law students. 3 s.h. spring. *Herrup*

235. Jurisprudence. A historical examination of the development of legal philosophy from ancient times to the contemporary period. 3 s.h. fall. *Christie*

507. Law and Literature (Seminar). An examination of lawyers' roles and legal problems in fiction and other literary forms. The seminar may also consider the significance of contemporary theories of literary criticism for legal analysis. A paper will be required. 2 s.h. (Not offered 1985-86.)

594. Professionalism, Theory and Power in Legal and Literary Studies (Seminar). The method of this seminar will be to study cases in law side by side with cases in literary criticism and theory in order to demonstrate how alike the two disciplines are in their procedures and in the problems they consider central to their enterprise. The similarity between the two disciplines extends to the range of problems they recognize and to the key terms in relation to which these problems are considered. The extensive debate concerning the possibility and desirability of recovering an author's intention in literary studies is matched in legal studies by a debate concerning the possibility and desirability of recovering judicial and legislative intent; and if literary critics argue as to whether or not interpretation depends on the reconstruction of historical circumstance, legal theorists dispute the nature and scope of precedent. It is also the case that the two disciplines display as many differences as they do similarities. If, as one legal theorist puts it, a judge must learn how to "read" in a way that avoids crises, literary critics (at least under a modern dispensation) must learn how to read in a way that multiplies crises. This means, in part, that the nature and exercise of authority will be quite different in the two disciplines, a difference that will be reflected in the channels by which authority is exercised and transmitted. 2 s.h. spring. *S. Fish*

527. Medical-Legal-Ethical Issues (Interdisciplinary Seminar). A seminar composed of students and faculty from the Medical, Law, and Divinity Schools that will critically consider selected pertinent issues of mutual professional interest. 2 s.h. spring. *Gianturco (medicine), M. Shimm (law), and H. Smith (divinity)*

516. Political Philosophy and Law (Seminar). Primary attention will be given to contemporary jurisprudence in Europe as seen through the work of Habermas. An introduction to continental political and judicial theory will be provided. The relation of contemporary thought to earlier Marxism will be explored. The seminar will not meet until the week of September 16 and will meet twice weekly for the six weeks thereafter. A paper on an assigned topic will be the basis for the grade. There

are no prerequisites. The seminar should be of special interest to students in the International Studies or Philosophy joint degree programs. Limited to 12 students. 2 s.h. fall. *Haarscher*

556. Responsibility in Law and Morals (Seminar). Investigation of the relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. Texts: Holmes, *The Common Law*; Hart, *Punishment and Responsibility*; Morris, *Freedom and Responsibility*. 2 s.h. (Not offered 1985-86.)

592. Selective Problems in American Law and Society, 1690-1972 (Seminar). The seminar will explore four (4) topics: the criminal law of slavery; law and economic development, emergence of the negligence principle; child custody and adoption in the 19th century; and the desegregation of Central High School, Little Rock, Arkansas. Paper option.

INDEPENDENT RESEARCH

Law students in their second and third year of the J.D. or LL.B. programs may undertake up to four semester-hours of independent research in any academic year if the research is approved by a faculty member. Research will be graded on a credit/fail basis. Students undertaking independent research will meet regularly with the faculty member supervising the research in order to ensure contemporaneous discussion, review, and evaluation of the research experience.

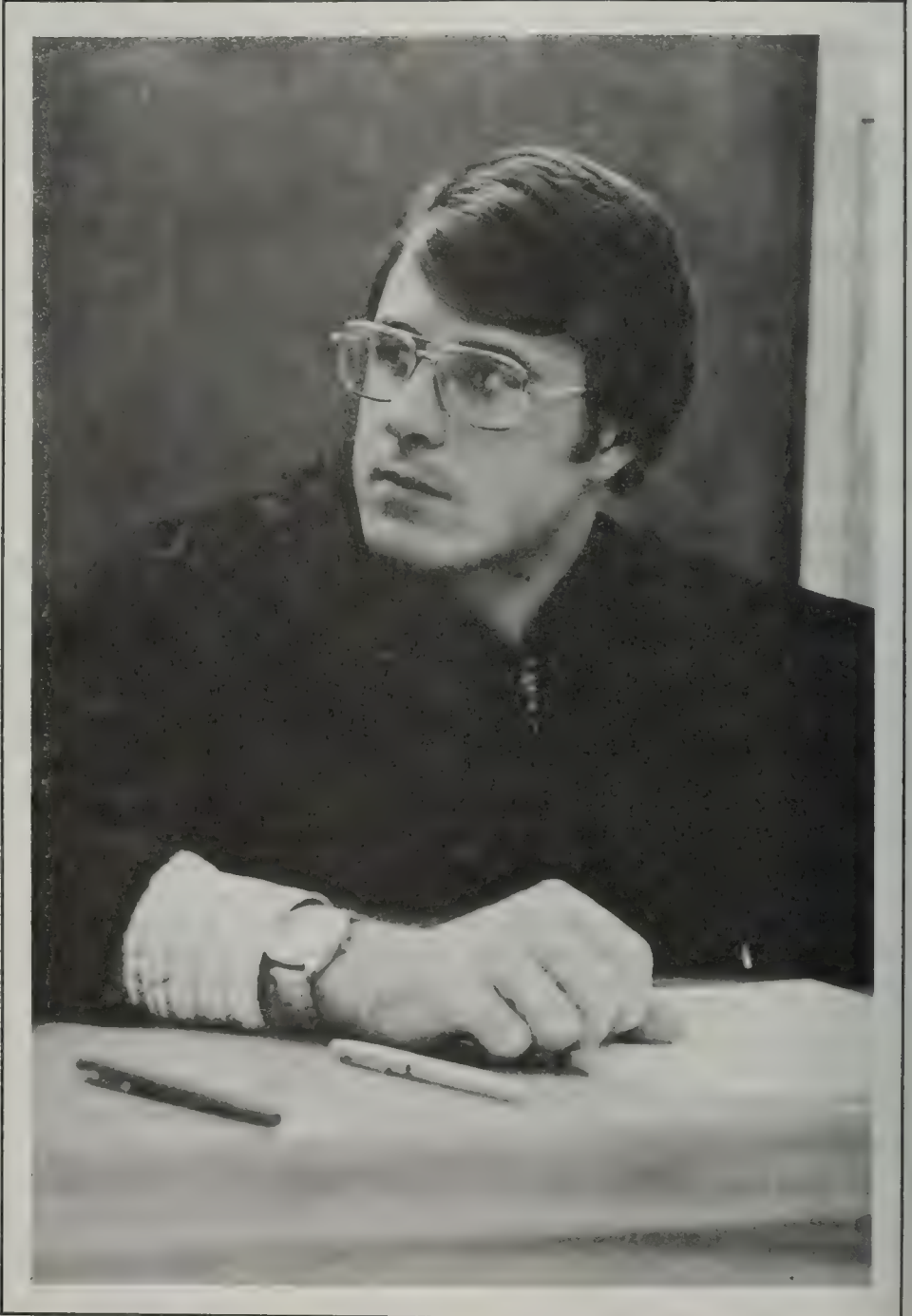
AD HOC SEMINARS

A group of five or more students may plan and conduct their own research and seminar program for not more than two semester-hours of credit (which shall be considered to be independent research within the meaning of the maximum limitation of four semester-hours of independent research each year). A request to establish such an ad hoc seminar should be addressed to the Dean at least two months before the end of the semester preceding the semester in which the seminar is proposed and contain an outline of coverage and required readings. The Dean will request a member of the faculty to evaluate the program and determine whether the proposed program has academic merit. If approved by the Dean, a faculty member will be requested to evaluate the contribution of each participant before awarding credit. A written paper of the kind generally submitted in seminars will be required of each participant. Such seminar work shall be graded on a credit/fail basis.

COURSES IN OTHER DIVISIONS OF THE UNIVERSITY

Second- and third-year students other than joint degree candidates may take courses offered in other divisions of the University. Credit (limited to a total of six semester-hours) toward the J.D. degree will be granted for courses of suitable academic rigor in which the student earns a grade of *P* (or its equivalent) or better. A written request for permission to enroll in a University course outside the Law School must be presented to the Coordinator of Student Administrative Services. The actual grade earned in the course will be made a part of the student's permanent record, but will not enter into the Law School grade point average unless the student receives a failing grade.

Degree Programs



Juris Doctor Degree

Upon favorable recommendation of the faculty, the degree of Doctor of Law (J.D.) will be conferred upon students who have successfully completed six semesters of law study in residence at Duke. Two semesters of law study undertaken at another accredited American law school may be counted toward the required total if the final two semesters (exclusive of a summer session) and a minimum of fifty-five semester-hours of law study are undertaken at Duke.

Students shall be deemed successfully to have completed six semesters of law study if, during a minimum of ninety academic weeks, they have satisfied the following requirements:

1. a passing grade in courses aggregating eighty-six semester-hours and
2. a grade-point average of at least 1.80 on a 4.0 scale and status in good standing under the rules of the Law School.

Bachelor of Laws Degree

Upon favorable recommendation of the faculty, the degree of Bachelor of Laws (LL.B.) will be conferred upon students who have satisfied all of the requirements listed above as necessary for the Doctor of Law degree but who do not possess a baccalaureate degree prior to completion of the program of study for the Doctor of Law degree.

Joint Degrees

Combined Doctor of Medicine-Law Degree. The School of Law and the School of Medicine of Duke University jointly sponsor a program of combined legal and medical education. The program provides an opportunity to acquire a full basic study of the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the J.D. and M.D. degrees.

The student in the M.D.-J.D. program begins a six-year course of study in the School of Medicine. As in the regular M.D. program, the first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point, the student usually enters the Law School, where the first-year curriculum is the same as that of other law students. During the next three or four semesters, the student may select courses in the Law School that are of special application to medical-legal interests. After completing law requirements, the student returns to the Medical School for elective clinical work tailored to the student's specialized needs. In addi-

tion, eighteen semester-hours, or two summer sessions, of elective basic science work are required.

Combined Master of Business Administration-Law Degree. The School of Law and the Graduate School of Business Administration of Duke University have established a combined program of studies in law and graduate level business administration. The aim of the program is to provide a small number of selected individuals with the opportunity to acquire an education in both law and business administration in a four-year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.B.A. and the J.D. degrees.

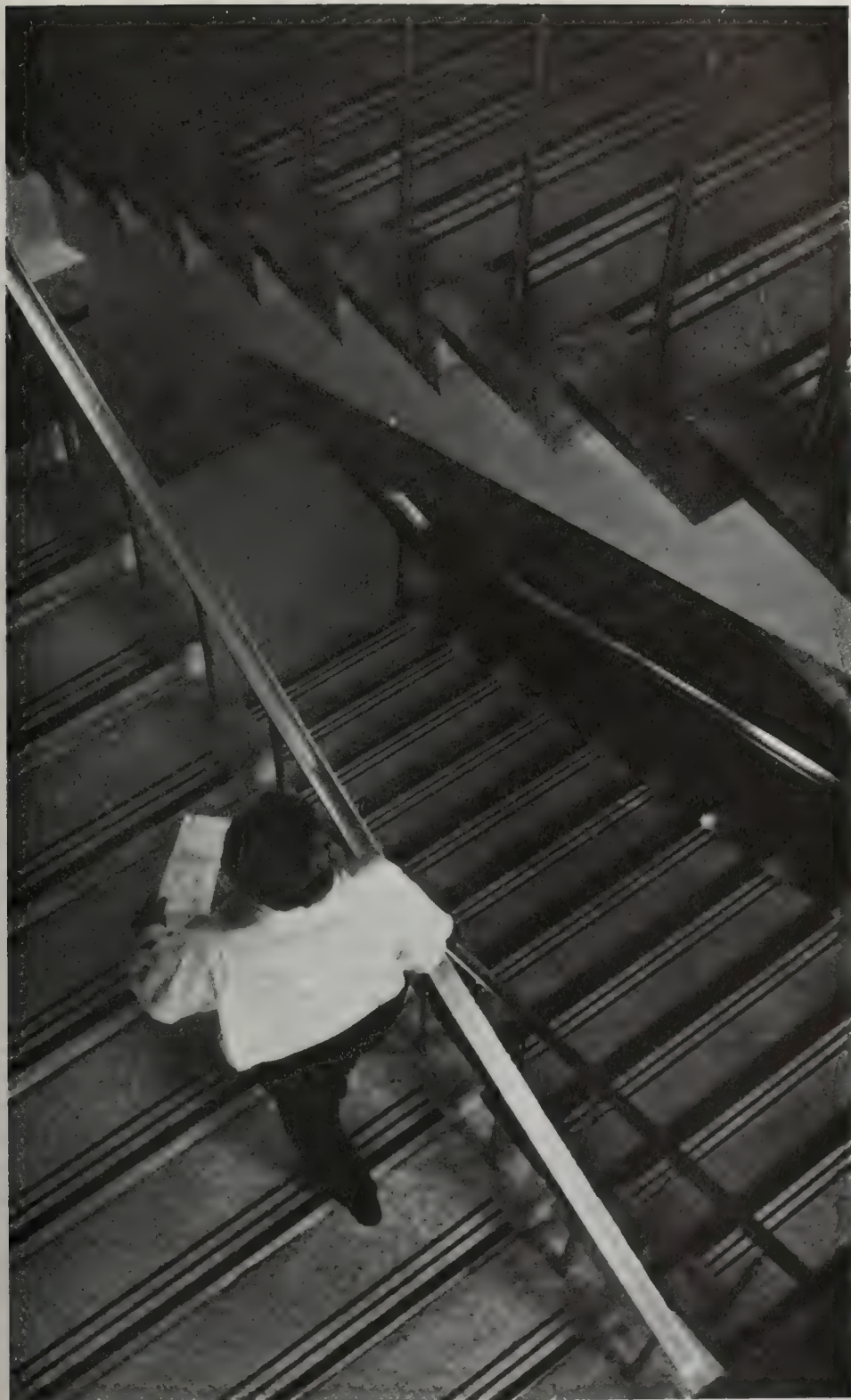
The student in the M.B.A.-J.D. program begins the first-year course of study in either the Graduate School of Business Administration or the School of Law. If the student begins in the Law School, the first-year curriculum is the same as that of other law students; if the student begins in the Graduate School of Business Administration, the first-year curriculum is the same as that of other graduate business students. The student's second year consists of the full first-year program of the other school. In the third and fourth years of the program, the student takes a mix of courses in both schools, but mainly in the Law School.

Combined Master of Health Administration-Law Degree. The School of Law and the Department of Health Administration have established a combined program of studies in law and health administration. The aim of the program is to provide interested persons with the opportunity to acquire an education in both law and health administration in an integrated four-year course of study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.H.A. and the J.D. degrees.

The student in the M.H.A.-J.D. program, after completing the first two semesters of the basic M.H.A. program, enters the Law School, where the first-year curriculum is the same as that of other law students. In the third and fourth years of the program, the student continues in the Law School, completing requirements for the law degree, including two electives approved by the Department of Health Administration, and takes ten more semester-hours of M.H.A. course work. In the Law School, the student is encouraged to emphasize courses relating to public law and administration. Opportunities for special activities in health law will be made available to the student by the Department of Health Administration over the course of the program.

Combined Master of Arts in Public Policy Sciences-Law Degree. The School of Law and the Institute of Policy Sciences of Duke University have established a combined program of studies in law and graduate level policy sciences. The aim of the program is to provide an opportunity for students to acquire decision-making skills and substantive policy knowledge that would be useful in either career or citizen roles dealing with problems of the public sector. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.A.P.P.S. and the J.D. degrees.

The combined program requires completion of seven or eight academic semesters and one summer internship. The first year is spent exclusively in the Law School pursuing the same course of study as do other first-year law students; the second year exclusively in the Institute of Policy Sciences; and the third and fourth years primarily in the Law School. In addition, the student must select a substantive policy area in which to concentrate from among the fields of the administration of justice, communications policy, health policy, and educational policy; a summer internship and thesis will be required in the chosen area. Beginning in 1985, students will also have the option of pursuing the M.A.P.P.S. through participation in the summer-entering program described in the next paragraph.



Combined Master of Arts-Law Degree The School of Law and the Graduate School of Duke University jointly sponsor a program of study in law and several alternative disciplines, including economics, history, philosophy, political science, and an interdisciplinary program in the humanities. The purpose of the program is to encourage the broader intellectual interests of law students and to foster dialogue between law and related disciplines. It is intended in part as an antidote for narrowing careerism that sometimes overtakes professional education. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.A. and J.D. degrees.

Students enter the program in the summer prior to the first year of Law School, undertaking a portion of the first-year law curriculum. Throughout their remaining six semesters in residence, students will combine their legal studies with courses selected from the Graduate School curriculum, taking two Graduate School courses per semester during the first year and four more Graduate School courses in the final four semesters.

Master of Legal Studies

Upon favorable recommendation of the faculty, the degree of Master of Legal Studies (M.L.S.) will be conferred upon students who have successfully completed a one-year program of study in the Law School. Students specially admitted to candidacy for this degree will pursue an individually designed curriculum including both first-year and upperclass courses. The degree may also be awarded to J.D. candidates who meet its requirements and who decide to abandon the study of law.

Students will be deemed successfully to have completed a one-year program of study in the Law School if, during a minimum of thirty academic weeks, they have satisfied the following requirements:

1. a passing grade in Law School courses aggregating thirty-one semester hours, excluding cross-listed courses, and including at least one course requiring substantial supervised writing, and
2. a grade-point average of at least 2.0 on a 4.0 scale and status in good standing under the rules of the Law School.

Graduate Study in Law

The Law School program is primarily designed to serve students seeking a first professional degree in American law. Except for international students and participants in the J.D./L.L.M. program described below, students are rarely admitted for the purpose of continuing the study of law at the master's or doctoral levels, although the faculty is empowered to authorize such admissions. Applications for such study by American graduates of American law schools are not sought. International students should consult the chapter of this bulletin addressed to them.

Combined Juris Doctor-Master of Laws Degree. Beginning in 1985, the Law School will offer the opportunity to selected J.D. candidates to pursue a Master of Laws degree emphasizing international and comparative law study. Students accepted to the program will enter in the summer of 1985, undertaking a portion of the regular first-year curriculum with students who are pursuing the joint J.D./M.A. program described above. During the remaining six semesters of law study, J.D./LL.M. students will complete requirements for both degrees. The courses selected for application toward the LL.M. will include not only the study of foreign legal systems, but also the social, economic, and political environment in which one particular foreign legal system functions. Drawing on the area studies programs at Duke for enrichment, the LL.M. program for American students will particularly emphasize study of the laws of Canada, China, Germany, and Japan. Opportunities for brief periods of study in those countries may be developed as part of this program.

Candidates for the LL.M. degree will be required to complete twenty credit hours of approved courses, including a significant written product, with a minimum grade point average of 2.2. Students must also demonstrate competency in at least one foreign language. Six of the twenty hours required for the LL.M. may be taken in the Graduate School or in upper level undergraduate course work, including advanced language study; six additional nonlaw hours are permitted to be applied toward the J.D. degree.

Beyond the Curriculum



Publications

Law and Contemporary Problems. Since 1933, the Law School has published the quarterly, *Law and Contemporary Problems*. The journal is distinctive among professional legal publications in both its format and its content. Each issue is devoted to papers from a symposium on a particular topic of contemporary interest. These topics reflect an interdisciplinary perspective with contributions by lawyers, economists, social scientists, scholars in other disciplines, and public officials.

The journal is widely distributed, and its subscribers include general university libraries, governmental agencies, and foreign educational institutions, as well as the more traditional law libraries and law firms.

About twenty upperclass law students serve on the staff of this publication. They are responsible for the editorial work, and contribute their own writing to the symposia. Ten second-year students are selected each year on the basis of their first-year grades and the evaluations of their first-year tutorial instructors. About five new third-year students are elected on the basis of their second-year grades as well as a writing program.

Duke Law Journal. The Law School publishes the *Duke Law Journal* six times a year. Edited by students, the *Journal* is among the most prestigious and influential legal publications in the country. Approximately one-third of the contents of each issue consists of student notes dealing with current legal developments; the balance is devoted to articles and comments by professors and practitioners. Full responsibility for the selection and editing of material is vested in the *Journal's* student editorial board and its elected officers.

Membership on the *Journal* is achieved in one of two ways. Several students are selected on the basis of outstanding performance during their first year of law school. Additionally, second-year students (including those transferring to Duke from other schools) may participate in a writing program; participants demonstrating exceptional writing ability are invited to become members of the *Journal*.

Each year one *Journal* issue is devoted to topics in administrative law. Subjects of recent articles and notes reflect both the variety and depth of current legal thought; these subjects have included copyright protection of computer programs, antitrust law and the health care industry, evolution of the Supreme Court's tenth amendment analysis, the "crumbling wall" separating church and state, and the effect of employee handbooks in modifying at-will employment contracts.

Alaska Law Review. Since 1983-84, Duke Law School has published the *Alaska Law Review*. Alaska has the highest number of lawyers per capita of any American

state, and a range of cutting edge legal issues in the areas of natural resources law, environmental law, land use planning, economic development, state-federal relations, and Native American rights. Since Alaska has no law school, Duke agreed with the Alaska Bar Association to provide a professional journal of law which would be responsive to the needs of Alaska's diverse legal community.

The *Alaska Law Review* is supervised by a board consisting of members of the Duke Law faculty and representatives of the Alaska Bar Association, but the student editors have primary responsibility for writing, editing, and managing the review. Twelve students are chosen for the review out of each rising second-year class on the basis of first-year grades and the recommendations of the first-year tutorial writing instructors.

Student notes form the bulk of the material in the review, which is published semiannually. The articles and student notes focus on topics of interest to the practicing attorney in Alaska.

Duke Law Magazine. The Law School publishes a semiannual review of the intellectual life of the school entitled *Duke Law Magazine*. Student-authored work is sometimes included, along with faculty essays and reports of events of academic significance to the school.

Honorary, Professional, and Social Organizations

Order of the Coif. The Order of the Coif is a national legal scholarship society with a local chapter at Duke University School of Law. Its purposes are "to foster a spirit of careful study and to mark in a fitting manner those who have attained a high grade of scholarship." Election is restricted to students standing scholastically in the highest 10 percent of the graduating class.

The Duke Bar Association. The Duke Bar Association coordinates the professional, social, and other extracurricular activities of the student body. The association resembles in its composition and purpose both a university student government and a professional bar association. It takes care of student grievances and serves as a mediator between students, faculty, and the administration. The association oversees all student organizations, publicizes Law School activities, sponsors athletic and social programs, and disperses its dues fund among the school's organizations.

Legal Research Program. The Legal Research Program, supervised by a student editorial board, provides second- and third-year students with an opportunity to prepare legal memoranda on actual problems submitted by practicing lawyers, judges, or legislative committees.

Moot Court Board. The Moot Court Board is composed of second- and third-year students who are chosen on the basis of their performances in intramural moot court competition. The board supervises the Hardt Cup and the Dean's Cup Competitions. In addition, the board provides personnel for teams entering intercollegiate competition.

Duke Law Forum. The Duke Law Forum, through films, seminars, and speakers, traditionally seeks to stimulate and educate debate on national and legal issues. The forum has also sought to provide intellectual respite from the law by sponsoring lectures in various topics in literature, history, and philosophy.

International Law Society. Membership in the Duke International Law Society is open to the entire law student body. The society sponsors an annual distinguished speaker series with lecture topics ranging from the law of warfare to peace negotiations, from the law of the seas to space law. The scope is limited only by the interests of the society members and the student body at large. The society is currently explor-

ing joint programs with local law schools, overseas study alternatives, and contributorships to international law journals throughout the country. Other activities include participation in the annual Philip C. Jessup International Moot Court Competition and attendance at conferences sponsored by the Association of Student International Law Societies.

Women's Law Society. Women's Law Society provides a central organization through which women law students can meet to form friendships and to share problems unique to women in the legal profession. The group works as a clearinghouse for information in areas of particular concern to women through bulletin board notices and informal presentations at faculty student receptions. The group also communicates with women's groups in other law schools in North Carolina, maintains memberships in several state and national organizations, and teaches an undergraduate course on women and the law.

Current and prospective women law students are encouraged to contact members of the Women's Law Society for information about the organization, Duke Law School, or the legal profession.

Deans' Advisory Council. Members of the Deans' Advisory Council are selected by the several deans of the Law School. Selection for membership reflects the collective judgment of the deans that the student is unusually deserving of trust and respect, and manifests traits for which the school would like to be known. The work of the council is to assist the administration of the Law School in its public contacts. Members represent the school in dealing with admissions applicants, placement interviewers, alumni, supporters, and guests. Membership in the organization generally continues after graduation; alumni members continue to assist in the same areas of administrative work. Membership involves a substantial commitment of time and energy to the welfare of the school.

Black Law Students Association. The Law School chapter of BLSA is affiliated with the regional and the national BLSA. The aims of the local chapter are to provide a responsive student organization to aid the individual black law student at Duke and to instill a greater awareness of and commitment to the needs of the black community.

American Bar Association's Law Student Division. The ABA/LSD, active in virtually every law school in the country, is the way for law students to make contact with the nation's largest professional association for lawyers, the American Bar Association. A member of the Fourth Circuit, along with the law schools of Virginia, West Virginia, and North and South Carolina, Duke has played a strong leadership role in the circuit as well as at the national level of the division. A small enrollment fee entitles the Law Student Division member to a subscription to the ABA magazine *Student Lawyer*, to inexpensive ABA-sponsored health insurance, and to information about the ABA's programs and publications on specialized areas of the law. The ABA/LSD also promotes various advocacy and essay contests throughout the school year.

Forum for Legal Alternatives. The FLA is made up of students from all three classes who are interested in information about less traditional legal careers. In the past few years the FLA has brought lawyers to the Law School to speak on legal services, environmental law, union labor law, child advocacy, government work, and setting up a solo practice after law school. The group works with the Placement Office to provide information on employment opportunities in the public interest fields and maintains contacts with the North Carolina chapter of the National Lawyers' Guild and other public interest and civil rights groups in the area. As a respite from its serious work, the FLA has a potluck dinner each semester.

Student Funded Fellowship. The SFF provides living-expense stipends to several students each year who work in nontraditional or public interest legal jobs. Law

students and members of the faculty and administration contribute to the SFE. The fund is then allocated to recipients by the fellowship's Board of Directors.

Voluntary Income Tax Assistance. For many years law student volunteers have provided tax preparation assistance to low-income people in the community. Two or more sites in Durham are staffed by the law school for eight weeks prior to the tax filing deadline.

Prisoners' Rights Project. The PRP provides a range of services to inmates of the North Carolina Department of Corrections including: research on inmate questions and grievances, intake interviews, assistance in habeas corpus motions and other suits, and work with mothers in prison. The PRP also arranges a tour of Central Prison, North Carolina's maximum security facility, so that students can get a first-hand view of one aspect of the criminal justice system in the state.

National Lawyers' Guild, Student Chapter. The National Lawyers' Guild is an organization of lawyers, legal workers, law students, and jailhouse workers with over 7,000 members in the 97 chapters throughout the United States. The guild was founded in 1937 as a multi-racial and progressive alternative to the American Bar Association.

Duke's student chapter aims to educate its members and the community of Duke University about the most significant battles for political, economic, and social change. The group opposes all forms of racial and sexual discrimination. The guild plans to hold forums and workshops on a wide range of issues, including U.S. militarism in Central America, U.S. support for South Africa's apartheid regime, the Ku Klux Klan, gay rights, legal services for the poor and elderly, the death penalty, and other topics. The guild will also seek to promote debate about alternative methods and theories of legal education. Finally, the chapter will be flexible and open to suggestions from its members for new projects.

The guild will have access to the programs of the national organization as well. The guild's numerous task forces and committees produce books, pamphlets, and litigations skills manuals on all areas of its work.

Legal Fraternities. The two legal fraternities are Hughes Inn of Phi Delta Phi and Wiley Rutledge Chapter of Phi Alpha Delta. These organizations sponsor luncheons, meetings featuring topics of professional interest, and several other social activities.

Entertainment and Recreation

Various recreational facilities are available on campus to students. The recently completed Bryan Center contains the Reynolds Theater and the Schaefer Laboratory Theater, as well as a film theater, an art gallery, banquet rooms which are available to students at minimal cost, and lounges and patios for student meetings.

Students of the Law School are also entitled to use the University gymnasiums, tennis courts, swimming pools, golf course, and other facilities. Within a short distance from the campus one may enjoy horseback riding, woodland hiking, and sailing. Other opportunities for physical activity are available in the intramural program, as well as through such activity groups as the outing, sailing, and cycling clubs. North Carolina's mild climate makes most outdoor sports possible during much of the school year. The Appalachian ski slopes are about three and a half hours to the west, the Outer Banks the same distance to the east.

University athletic contests are held on the campus at various times during the academic year. Duke is a member of the Atlantic Coast Conference.

Employment Opportunities

The study of law is demanding. It is designed to occupy the full time of the student and calls for the highest level of concentration. It is unwise for students to dilute their efforts by outside work, especially during the critical first year of study.

For those who find some outside earnings necessary to meet the expense of studying law at Duke and who qualify for the college work/study program under applicable federal regulations, arrangements have been made to provide some part-time employment in the Law School. A number of positions in the law library are filled by law students. Students are often employed in their second and third years as research assistants for faculty members. The University maintains a general placement office to aid in finding employment, and law students may serve as undergraduate residence advisers if they have been at Duke one year or have previously held such positions.

Law student spouses who seek employment will find opportunities as good here as in most other areas of the country. Laboratory and technical workers, secretaries, computer programmers, technicians, and medical personnel are among the workers most in demand in this area. Spouses who are teachers will find the names of the superintendents of schools in nearby districts listed in the *Duke Law School Handbook* (see below). The University personnel office and the Medical Center personnel office assist interested persons on locating suitable employment on campus.

The Duke Law School Handbook

Incoming students are supplied with a handbook containing useful information which is compiled and updated each year by the DBA. Topics covered include housing, transportation, living needs and expenses, Law School facilities, student health facts including information on the University's Counseling and Psychological Services, and data for married students such as educational and employment opportunities. Also included in the handbook is information on facilities for the handicapped, for whom the school makes special provision as required above and beyond its already considerable accessibility.

Law Library



The written law in its variety of forms is the basic working material of the practicing attorney and the legal scholar. At Duke, law students utilize the resources of the library collection and the skills of the highly trained library staff in the development of research skills that will serve them throughout their professional careers.

The Duke Law Library is more than a repository of books. Recognizing its place at the center of the Law School community, the library offers accessible, well-organized collections and services. Both group and individual study areas are arranged in proximity to the most-used materials. The entire collection of over 350,000 volumes is a major research collection designed for the educational needs of law students. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. Materials subject to heavy student use are available in multiple copies. Comprehensive collections of records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, the New York Court of Appeals, and the North Carolina Supreme Court and Court of Appeals are maintained in microform and hard copy. The library maintains an extensive, and continuously expanding, collection of legal treatises. These are organized in the familiar Library of Congress classification system and are accessible through a public catalog, generated by a computer-based card-production system. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material.

The periodical collection includes extensive runs of all major legal research journals, bar association publications, institute proceedings, and newsletters. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. Hard copy document holdings are supplemented by an extensive microform collection, which includes complete runs of the *Congressional Record* and the *Federal Register*, all post-1970 congressional materials, congressional committee prints dating back to the mid-nineteenth century, and a number of special subject collections. In addition, law students have access to the extensive documents collection of the main campus library. Important state government documents are collected in both hard copy and microform.

In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in Canadian, other commonwealth, and European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics.



But the success of a law school library depends as much on the quality of the services it provides as on the strengths of its collection. At Duke, the library staff includes eight librarians with graduate degrees, four of whom hold additional degrees in law. The staff takes its role in the legal education process seriously. The law-trained staff members serve as instructors for the legal bibliography segments of the first-year research and writing program and regularly offer seminars in topics of advanced legal research. The staff now provides access to a variety of computerized information sources. The two major legal databases, LEXIS and WESTLAW, are used for research and training purposes. In addition, an increasing number of full-text and bibliographic databases and comprehensive indexing services are available through NEXIS and DIALOG, as well as the CCH Electronic Search System. The staff produces a series of research guides, a newsletter, and various current-awareness services. It also maintains bibliographies of books and articles by Law School faculty members. In 1984, these library publications were honored with the American Association of Law Libraries' Law Library Publications Award. Presently, AALL's quarterly journal, *Law Library Journal*, is edited at Duke.

The library is part of the Law School and is administered independently of the main library system at Duke. The Duke University Libraries (Perkins, Law, Business, and Medical) contain one of the major research collections in the country, holding well over 3,000,000 volumes.

To obtain materials not available locally, the law library staff makes use of a computerized interlibrary loan network, which allows retrieval of information from libraries throughout the country. Cooperation with other libraries, both on and off campus, ensures that materials are available when needed for the Law School community.

The staff of the Law Library in 1985-86 includes the following professionals:

Richard A. Danner, B.A., M.S., J.D., *Director of the Law Library and Associate Professor of Legal Research*

Hope E. Breeze, B.A., M.L.S., *Head of Technical Services*

Michael G. Chiorazzi, B.A., M.L.L., J.D., *Reference Librarian and Instructor in Legal Research*

Janeen J. Denson, A.B., M.S.L.S., *Circulation Librarian*

Claire M. Germain, B.A., LL.B., M.C.L., M.L.L., *Assistant Librarian for Information Services and Senior Lecturer in Comparative Law and Legal Research*

Gretchen P. Wolf, B.S., M.S., *Acquisitions Librarian*

International Students



International Law Study at Duke

Each year the Law School welcomes applications from highly qualified foreign students who seek exposure to the American legal system and profession. Overseas applicants should recognize that enormous difficulty inheres in the study of a foreign legal system. No other academic discipline is so inculturated and makes such enormous demands on the intellectual adaptability of the student. Foreign students at Duke must, of necessity, enter into the regular program designed for very able professional students who are presumed to possess a substantial background in their own American culture. Moreover, law study makes substantial demands on the language skills of even those who are native users of English; if a language problem is added to the other inherent difficulties of foreign law study, the disadvantage to the foreign student is further increased.

The Law School does make a special effort to help foreign students with their adjustment. The International Adviser serves as Admissions Officer for foreign students and is also available to assist with housing, immigration, and personal problems. The Duke University International House sponsors a week-long orientation for all foreign students new to Duke, and students are encouraged to participate in the Law School orientation for entering J.D. students. Students will receive academic counseling as well as instruction in American techniques of legal research and writing.

Degree Programs for International Students

Foreign students may be considered for the following degree programs:

Juris Doctor (J.D.). Foreign students may be admitted for the J.D. degree. This program should only be attempted by students who find themselves ready to handle the difficulties of an American legal education. Such candidates must present satisfactory scores on both the Law School Admission Test (LSAT) administered to American applicants and the Test of English as a Foreign Language (TOEFL). Candidates who have earned professional law degrees in systems not dissimilar to the American system may occasionally receive credit for as much as one-third of the course work ordinarily required for the completion of the J.D. program. All inquiries about the J.D. program should be directed to the Law School Office of Admissions.

Master of Laws (LL.M.). Most international students seek the master's degree, having already been trained in the law of their own countries. To qualify for this degree, the student must successfully complete two semesters of study in residence,

and must complete no fewer than twenty semester-hours. Included in the twenty credits of work must be at least two credits of individual written work completed either in a seminar or in an independent study course supervised by a faculty member. Students are also required to take a first-year course, which will bring them into close contact with a small group of American students who are facing similar academic challenges. Most foreign students will be expected to enroll in the two-credit course, American Law for International Students.

The remainder of the academic program is individually selected by the student from the curriculum offerings for first-year and upperclass students. International students will attend classes with American students and will participate in the same grading procedures. All international students will receive the guidance of an academic adviser who is a faculty member at the Law School. The degree will be granted to students who achieve a grade point average of 2.2 on a 4.0 scale by the end of the academic year. Candidates are expected to complete the LL.M. degree in one year except in exceptional circumstances.

Doctor of Juridical Science (S.J.D.). Foreign students who have already earned a degree in American law at the master's level may apply for admission to the S.J.D. degree. Only students who have achieved excellent academic records throughout their law study and, in particular, during the master's degree program should seek admission. Very few applicants gain admission.

Applicants to the S.J.D. program should submit all materials promptly. In order to evaluate the application, it is necessary for Duke Law School to have a proposal for the doctoral thesis and at least one sample of written work, such as a completed seminar paper. References from professors who have taught applicants at the master's level should also be provided. A transcript of all courses completed at the master's level must be received before consideration can be given to an application. At the discretion of the Committee on International and Comparative Studies, candidates may be asked to complete one or more semesters of course work before beginning the doctoral thesis. The program will take from two to three years to complete, depending on the time required to write the doctoral thesis.



Admission of International Students

A separate admission process is maintained for foreign students applying to the LL.M. or S.J.D. programs. Prospective applicants should write for forms and information to Judith Horowitz, Administrator for International Studies. An application fee of \$45 is charged and should accompany the application. Students who are not native speakers of English are required to present a satisfactory score on the Test of English as a Foreign Language (TOEFL), which is administered by the Educational Testing Service of Princeton, New Jersey. For further information, appropriate officials at the student's university should be consulted.

Applications and supporting material should reach Duke by February 15. Students who sit for the TOEFL later than January should be advised that it often takes up to two months for examination results to reach Duke. Late TOEFL scores may seriously delay or even jeopardize admissions decisions. Admission is for the fall semester only.

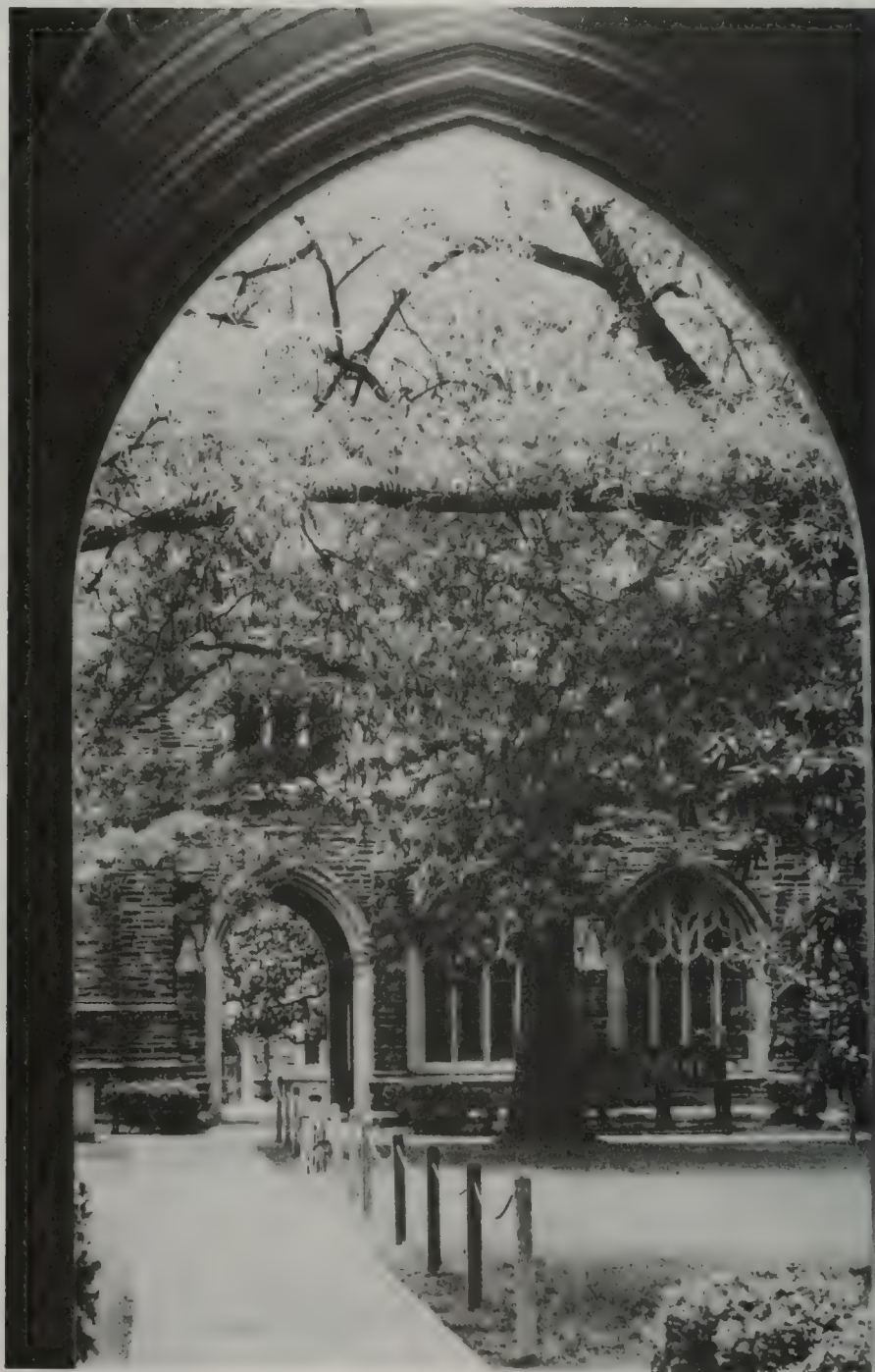
Financial Aid

Duke can offer very little financial assistance to foreign students. Foreign applicants will be required to supply assurance of their ability to pay their tuition and living expenses. A deposit fee of \$400 will be required to confirm acceptance of a position at the Law School.

Placement with American Law Firms

The Duke program for international students is directed primarily to those who will return to their home countries upon receipt of their degrees. Some students have found, however, that their exposure to the American legal system is enriched by a short internship with an American law firm before returning home. The placement office does not have a formal placement program for such students but does maintain a list of American law firms that have expressed an interest in interviewing foreign students, and it will assist in scheduling interviews.

Placement



Placement Services

Placement of law students and graduates is the concern of an active placement office. Its staff includes the Director of Placement, two staff members, and occasional student aides. The activities of the placement office can be broken down into several categories: coordination of an extensive on-campus recruiting season; custodial responsibility for a wealth of materials on legal careers, available positions, bar memberships, and other related matters; and assisting students and recent graduates throughout the year in the job placement process.

The advantages of attending a school the size of Duke extend into the placement process. The placement office staff is happy to help students in their job hunt and because of the student body size, student questions can be dealt with on an individual basis. Services provided by the placement office include individual assistance in resumé and cover letter writing; personal counseling on career choices, job opportunities, and strategies; workshops and seminars on everything from values clarification to firms in "off-Broadway" cities; and information regarding the on-campus interviewing process. Because of Duke's national prominence, a large number of employers visit the campus each fall to interview second- and third-year students. About 400 employers from all over the country interview about 375 students. In addition, almost 1,000 employers a year write to request student resumé. With the wide variety of employment possibilities available, a substantial number of students in each of these classes receive offers of employment.

Because of the diverse background of the student body, there is a good geographical distribution of employers who express interest in Duke Law School students. Generally speaking, about two-thirds of the students will find employment in a broad "eastern corridor" that stretches from Boston to Miami. The remaining third of the students find jobs in most of the remaining mid-western and western states. About one in ten students begin their professional careers as judicial clerks, including several who serve on the staffs of federal appellate judges. A large number of students accept employment with private law firms, but there is a steady core of students whose interests range among public service organizations, governmental agencies, business corporations, and other areas. Beginning salaries exceed \$45,000 in the largest cities, but the median for first jobs is substantially lower. By graduation of each year approximately 85 percent of both the second- and third-year classes have found employment. Since jobs continue to be available after that time, the hiring rate continues to improve over the summer. The placement office makes every effort to assist students in finding the kind of legal employment they seek.



First-year students most actively seek employment during the spring semester. There is a small on-campus interviewing program between January and March. In addition, listings of employers who seek first-year clerks are available throughout the semester. The placement office also collects lists of legal internships and law-related summer volunteer opportunities that may be of interest to first-year students. The placement office encourages students to explore the variety of professional opportunities available to them and seeks to instruct them in effective job-hunting as well. It should be noted, however, that the students themselves are primarily responsible for finding their own employment. They must be willing to devote a large amount of their time to letter-writing and to interviewing. The Law School diligently attempts to assist its graduates, but the ultimate responsibility rests with each student.

Bar Examinations and Requirements

Many states now require that students, prior to or shortly after beginning the study of law, register with the Board of Bar Examiners of the state in which they plan to practice. Prior to selecting the law school they will attend, at matriculation, and at the beginning of each subsequent year of law school, applicants are advised to consult the rules of all states in which they may be interested in practicing after graduation to determine the curriculum and other requirements of state bar examining authorities.

Appendix A

Former Schools of Duke Law Students

Agnes Scott College	1	Kenyon College	1
Albion College	1	Lafayette College	2
Alfred University	1	Lawrence University	1
Alma College	1	Lehigh University	1
American University	2	Lewis and Clark College	1
Antioch College	2	Louisiana State University	1
Appalachian State University	1	Loyola University	4
Arizona State University	3	Lycoming College	1
Asbury College	1	MacMurray College	1
Auburn College	1	Macalester College	1
Augustana College	1	MacMurray College	1
Barnard College	2	Manhattanville College	1
Birmingham-Southern College	2	Massachusetts Institute of Technology	1
Bob Jones University	2	Michigan State University	1
Boise State University	1	Middlebury College	2
Boston College	10	Millsaps College	1
Brandeis University	7	Mount Holyoke College	6
Brigham Young University	1	Muhlenberg College	1
Brown University	4	New York University	3
Bryn Mawr College	3	Northwestern University	4
Bucknell University	1	Oberlin College	3
Canisius College	1	Occidental College	2
Carleton College	1	Ohio State University	4
Carnegie-Mellon University	1	Ohio Wesleyan University	1
Centre College of Kentucky	1	Pacific Lutheran	1
Claremont Men's College	1	Pennsylvania State University	5
Clemson University	1	Pratt Institute	1
Colby College	1	Princeton University	10
Colgate University	9	Providence College	1
College of St. Elizabeth	1	Purdue University	1
College of William and Mary	2	Queens College	1
Colorado College	1	Reed College	1
Colorado State University	1	Rice University	2
Columbia University	11	Rollins College	2
Cornell University	9	Skidmore College	1
Dartmouth College	5	Smith College	3
Davidson College	6	Southern College	1
Denison University	1	Southern Methodist University	1
DePaul University	2	Southwestern at Memphis	3
DePauw University	2	Spelman College	1
Dickinson College	1	Spring Hill College	1
Duke University	57	Stanford University	4
East Tennessee State University	1	St. John's University	1
Emory University	2	St. Louis University	1
Florida State University	6	St. Norbert College	1
Franklin and Marshall College	1	Stetson University	3
Furman University	2	State University of New York at Albany	3
Georgetown University	3	State University of New York at Binghamton	10
Georgia Institute of Technology	2	State University of New York at Buffalo	2
Guilford College	1	State University of New York at Stony Brook	1
Hamilton College	1	Sweet Briar College	1
Hamline College	1	Texas Tech University	1
Harvard University	12	Transylvania University	1
Haverford College	5	Trinity College	2
Huntingdon College	1	Tufts University	6
Indiana University	2	Tulane University	3
Ithaca College	1	Union College	3
Johns Hopkins University	9	United States Air Force Academy	6
Juniata College	1	United States Military Academy	3
Kent State University	1	United States Naval Academy	1

University of Arkansas	2	University of Southern California	1
University of California at Davis	1	University of Southern Florida	3
University of California at Irvine	1	University of Tennessee	3
University of California at Los Angeles	2	University of Texas	5
University of Chicago	2	University of Vermont	1
University of Delaware	1	University of Virginia	11
University of Florida	7	University of Washington	3
University of Georgia	1	University of West Virginia	2
University of Illinois	6	University of Wisconsin	2
University of Kentucky	4	Utah State University	1
University of Maine	1	Vanderbilt University	7
University of Maryland	3	Vassar College	3
University of Miami	3	Villanova University	1
University of Michigan	8	Virginia Polytechnic Institute and State University	1
University of Minnesota	1	Wabash College	2
University of Mississippi	1	Wake Forest University	1
University of Missouri	6	Washington and Jefferson College	2
University of New Hampshire	1	Wellesley College	3
University of North Carolina at Chapel Hill	8	Wheaton College	3
University of North Carolina at Greensboro	1	Wichita State University	1
University of Notre Dame	20	Williams College	3
University of Pennsylvania	14	Wittenberg University	1
University of Rhode Island	2	Yale University	6
University of the South	1		
University of South Carolina	2		

Appendix B

Foreign Universities

Aarhus University	1	Seoul National University	2
Beijing Institute	3	University of Aston	1
Central Police College	1	Universidad Catolica	1
Foreign Trade Institute	1	University of Louvain	1
Forman Christian College	1	University of Santa Maria	1
Groningen University	1	University of Zurich	1
National Chung-Hsing University	1	Warsaw University	1
Peking University	1		

Home States of Duke Law Students

Alabama	14	Missouri	10
Arizona	4	Nebraska	1
Arkansas	2	New Hampshire	2
California	15	New Jersey	20
Colorado	4	New York	90
Connecticut	17	North Carolina	36
Delaware	1	North Dakota	1
District of Columbia	3	Ohio	21
Florida	53	Oklahoma	1
Georgia	19	Oregon	2
Hawaii	1	Pennsylvania	25
Idaho	2	Rhode Island	5
Illinois	21	South Carolina	11
Indiana	10	South Dakota	2
Kansas	4	Tennessee	15
Kentucky	13	Texas	5
Louisiana	8	Utah	1
Maryland	27	Vermont	1
Massachusetts	19	Virginia	18
Michigan	7	Washington	3
Minnesota	6	West Virginia	3
Mississippi	2	Wisconsin	5

Foreign Countries

Austria	1	Korea	2
Belgium	2	Malaysia	1
Canada	2	Netherlands	1
China (PRC)	5	Pakistan	1
Denmark	1	Panama	2
England	1	Poland	1
Germany, West	2	Switzerland	1
Finland	1	Taiwan (ROC)	2
India	1	Venezuela	1
Japan	3		

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bulletin of
Duke University 1985-86

The Divinity School



bulletin of
Duke University 1985-86

The Divinity School

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The information in the bulletin applies to the academic year 1985-86 and is accurate and current, to the best of our knowledge, as of February, 1985. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, call Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111.

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Calendar of the Divinity School

1985

August		
	21	Wednesday—Orientation for new students begins
	22	Thursday—Orientation continues
	23	Friday, 9:00-10:30 A.M.—Registration for returning students; 10:30-12:00 noon—Registration for new students
	26	Monday, 8:00 A.M.—Fall semester classes begin
	26	Monday—Drop/add period begins
September		
	3	Tuesday, 10:00 A.M.—Divinity School opening convocation —Duke University Chapel
	6	Friday, 12:00 noon—Drop/add period ends
October		
	11	Friday, 6:00 P.M.—Fall recess begins
	16	Wednesday, 8:00 A.M.—Classes resume
	23-26	Wednesday-Thursday—Registration for spring semester
November		
	4-6	Monday-Wednesday—Divinity School Convocation and Pastors' School, Gray Lectures and Hickman Lectures
	22	Friday, 6:00 P.M.—Thanksgiving recess begins
December		
	2	Monday, 8:00 A.M.—Classes resume
	6	Friday—Fall semester classes end
	10	Tuesday—Final examinations begin
	13	Friday—Final examinations end

1986

January		
	2	Thursday—Orientation for new students
	3	Friday—Registration for new students; registration changes for returning students
	6	Monday—Spring semester classes begin
	6	Monday—Drop/add period begins
	17	Friday, 12:00 noon—Drop/add period ends
February		
	28	Friday, 6:00 P.M.—Spring recess begins
March		
	10	Monday, 8:00 A.M.—Classes resume
	19-20	Wednesday-Thursday—Registration for fall semester
April		
	16	Wednesday, 10:00 A.M.—Divinity School closing convocation —Duke University Chapel
	18	Friday—Spring semester classes end
	22	Tuesday—Final examinations begin
	25	Friday—Final examinations end
May		
	3	Saturday, 6:30 P.M.—Divinity School baccalaureate service
	4	Sunday, 3:00 P.M.—Commencement exercises

University Administration

GENERAL ADMINISTRATION

H. Keith H. Brodie, M.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
Eugene J. McDonald, LL.M., *Senior Vice-President*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Development and Alumni Affairs*
William L. Green, Jr., A.B., *Vice-President for University Relations*
Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
Roger L. Marshall, A.B., *Secretary of the University*
Andrew G. Wallace, M.D., *Vice-Chancellor for Health Affairs*
Joel L. Fleishman, LL.M., *Vice-Chancellor*
Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
R. James Henderson, M.Ed., *Associate Vice-President and Business Manager*

Divinity School Administration

EDUCATIONAL ADMINISTRATION

Dennis M. Campbell (1979), B.D., Ph.D., *Dean of the Divinity School*
Robert L. Wilson (1970), B.D., Ph.D., *Associate Dean for Curricular Affairs*
B. Maurice Ritchie (1973), B.D., *Assistant Dean for Field Education and Student Services*
Grant S. Shockley (1983), M.Div., Ed.D., *Director of Black Church Affairs*
Paula E. Gilbert (1980), M.Div., Ph.D., *Director of Admissions and Student Affairs*
Wesley F. Brown (1981), M.Div., *Director of Development and Alumni Affairs*
W. Joseph Mann (1984), M.Div., S.T.M., *Director of Development and Alumni Affairs*
Christopher Walters-Bugbee (1983), B.A., *Director of Communications*
Clara S. Godwin (1969), *Administrative Assistant for General Administration and Finance*
Wilson O. Weldon (1981), B.D., D.D., *Special Assistant to the Dean*

Division of Special Programs

Richard A. Goodling (1959), B.D., Ph.D., *Director of Programs in Pastoral Psychology*
Peter G. Keese (1973), S.T.B., Th.M., *Director of Clinical Pastoral Education*
Robert L. Wilson (1970), B.D., Ph.D., *Director, J. M. Ormond Center for Research, Planning, and Development*

Division of Advanced Studies

Stanley Hauerwas, Ph.D., *Director of Graduate Studies in Religion*

Library

Donn Michael Farris (1950), M.Div., M.S. in L.S., *Librarian*
Harriet V. Leonard (1960), M.Div., M.S. in L.S., *Reference Librarian*
Linda Gard, A.B., M.Div., *Circulation Librarian*
Teresa Lynn Dause, B.S. in L.S., *Assistant Circulation Librarian*
Alison C. Greene, B.A., *Assistant to the Librarian*

SECRETARIAL STAFF

Anita Gail Chappell, *Faculty Secretary*
Mary P. Chestnut, *Secretary, Office of Black Church Affairs and Faculty Secretary*
Sarah Freedman, M.A., *Faculty Secretary*
Dawn Hester, *Secretary, Office of Admissions and Student Affairs*
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Patsy E. Martin, *Administrative Secretary, Office of the Dean*
Margie M. Meeler, *Secretary, Office of Field Education and Student Services*
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Marie Smith, *Secretary, Office of Development and Alumni Affairs and Faculty Secretary*
Mary C. Tilley, *Administrative Secretary, Registry*

FACULTY

- Lloyd Richard Bailey (1971), B.D., Ph.D., *Associate Professor of Old Testament*
 Waldo Beach (1946), B.D., Ph.D., *Professor of Christian Ethics*
 Dennis M. Campbell (1979), B.D., Ph.D., *Professor of Theology*
 James Michael Efird (1962), B.D., Ph.D., *Associate Professor of Biblical Languages and Interpretation*
 Richard L. Eslinger (1983), S.T.B., Ph.D., *Associate Professor of Christian Worship*
 Donn Michael Farris (1950), M.Div., M.S. in L.S., *Professor of Theological Bibliography*
 Mary McClintock Fulkerson (1983), M.Div., *Instructor in Historical Theology*
 Paula E. Gilbert (1985), M.Div., Ph.D., *Instructor in American Christianity*
 Richard A. Goodling (1959), B.D., Ph.D., *Professor of Pastoral Psychology*
 Robert Clark Gregg (1974), S.T.B., Ph.D., *Associate Professor of Patristics and Medieval Church History*
 Stanley Hauerwas, B.D., M.A., M.Phil., Ph.D., *Professor of Theological Ethics*
 *Frederick Herzog (1960), Th.D., *Professor of Systematic Theology*
 Osmond Kelly Ingram (1959), B.D., *Professor of Parish Ministry*
 Creighton Lacy (1953), B.D., Ph.D., *Professor of World Christianity*
 Thomas A. Langford (1956), B.D., Ph.D., D.D., *Professor of Systematic Theology*
 Richard Lischer (1979), M.A., B.D., Ph.D., *Assistant Professor of Homiletics*
 Paul A. Mickey (1970), B.D., Ph.D., *Associate Professor of Pastoral Theology*
 †Roland E. Murphy (1971), M.A., S.T.D., S.S.L., *George Washington Ivey Professor of Old Testament*
 C. G. Newsome (1978), M.Div., Ph.D., *Assistant Professor of American Christianity*
 Grant S. Shockley (1983), M.Div., Ed.D., *Professor of Christian Education*
 Dwight Moody Smith, Jr. (1965), B.D., Ph.D., *Professor of New Testament Interpretation*
 Harmon L. Smith (1962), B.D., Ph.D., *Professor of Moral Theology*
 David Curtis Steinmetz (1971), B.D., Th.D., *Professor of Church History and Doctrine*
 William C. Turner, Jr. (1982), M.Div., *Assistant Professor of Theology and Black Church Studies*
 Dan O. Via (1984), B.D., Ph.D., *Professor of New Testament*
 Geoffrey Wainwright (1983), B.D., Th.D., *Professor of Systematic Theology*
 John H. Westerhoff III (1974), M.Div., Ed.D., *Professor of Religion and Education*
 William H. Willimon (1984), M.Div., S.T.D., *Professor of the Practice of Christian Ministry*
 Robert L. Wilson (1970), B.D., Ph.D., *Research Professor of Church and Society*

FACULTY, DEPARTMENT OF RELIGION

(Teachers in graduate program in religion whose courses are open to Divinity School students.)

- Kalman Bland (1973), Ph.D., *Associate Professor of Judaic Studies*
 David G. Bradley (1949), Ph.D., *Professor of History of Religions*
 Elizabeth Clark (1982), Ph.D., *Professor of History of Christianity*
 Roger Corless (1970), Ph.D., *Associate Professor of History of Religions*
 Wesley A. Kort (1965), Ph.D., *Professor of Religion and Literature*
 Bruce B. Lawrence (1971), Ph.D., *Professor of History of Religions*
 C. Eric Lincoln (1976), Ph.D., *Professor of Sociology of Religion*
 Charles H. Long (1974), Ph.D., *Professor of History of Religions*
 Carol L. Meyers (1979), Ph.D., *Assistant Professor of Old Testament*
 Eric M. Meyers (1969), Ph.D., *Professor of Judaic Studies*
 Robert T. Osborn (1954), Ph.D., *Professor of Theology*
 Harry B. Partin (1964), Ph.D., *Associate Professor of History of Religions*
 Melvin K. H. Peters (1983), Ph.D., *Associate Professor of Old Testament*
 William H. Poteat (1960), Ph.D., *Professor of Religion and Culture*
 Sandra P. Robinson (1983), Ph.D., *Assistant Professor of History of Religions*
 Orval Wintermute (1958), Ph.D., *Professor of Old Testament*

RELATED FACULTY

- Albert F. Fisher (1974), M.Div., *Adjunct Professor of Parish Work*
 W. Kenneth Goodson, B.D., D.D., *Bishop-in-Residence*
 P. Wesley Aitken (1953), B.D., Th.M., *Chaplain Supervisor of Duke Medical Center and Associate in Instruction, the Divinity School*
 David M. Franzen (1977), B.D., Th.M., *Chaplain Supervisor of Duke Medical Center and Associate in Instruction, the Divinity School*
 Peter G. Keese (1973), S.T.B., Th.M., *Chaplain Supervisor of Duke Medical Center and Associate in Instruction, the Divinity School*

*Sabbatical leave, fall 1985.

†Leave of absence, fall 1985.

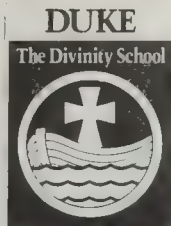
EMERITI

Frank Baker (1960), B.D., Ph.D., *Professor Emeritus of English Church History*
Robert Earl Cushman (1945), B.D., Ph.D., Litt.D., *Research Professor Emeritus of Systematic Theology*
William David Davies (1966), M.A., F.B.A., D.Litt., *George Washington Ivey Professor Emeritus of Advanced Studies and Research in Christian Origins*
Stuart C. Henry (1959), B.D., Ph.D., *Professor Emeritus of American Christianity*
William Arthur Kale (1952), B.D., D.D., *Professor Emeritus of Christian Education*
M. Wilson Nesbitt (1958), B.D., D.D., *Adjunct Professor Emeritus of the Work of the Rural Church*
Ray C. Petry (1937), Ph.D., LL.D., *James B. Duke Professor Emeritus of Church History*
McMurry S. Richey (1954), B.D., Ph.D., *Professor Emeritus of Theology and Christian Nurture*
Charles K. Robinson (1961), B.D., Ph.D., *Associate Professor of Philosophical Theology*
John Jesse Rudin II (1945), B.D., Ph.D., *Associate Professor Emeritus of Liturgy and Worship*
H. Shelton Smith (1931), Ph.D., D.D., Litt.D., *James B. Duke Professor Emeritus of American Religious Thought*
William Franklin Stinespring (1936), Ph.D., *Professor Emeritus of Old Testament and Semitics*
Arley John Walton (1948), B.S.L., D.D., *Professor Emeritus of Church Administration and Director of Field Work*
Franklin Woodrow Young (1968), B.D., Ph.D., *Amos Ragan Kearns Professor Emeritus of New Testament and Patristic Studies*

BOARD OF VISITORS

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Robert W. Bradshaw, Jr. (1986), Charlotte, North Carolina
Dean Dennis M. Campbell (*ex officio*), Durham, North Carolina
Thelma Barclift Crowder (1987), South Boston, Virginia
Randolph R. Few (1987), Durham, North Carolina
The Reverend Albert F. Fisher (*ex officio*), Durham, North Carolina
The Reverend F. Owen Fitzgerald (1985), Raleigh, North Carolina
Bishop W. Kenneth Goodson (*ex officio*), Durham, North Carolina
Margaret Harvey (1986), Kinston, North Carolina
Sarah Jordan (1986), Mt. Gilead, North Carolina
The Reverend Wallace H. Kirby (1987), Durham, North Carolina
Professor Robin W. Lovin (1987), Chicago, Illinois
Mary Alice Massey (1985), Jacksonville, Florida
The Reverend William K. Quick (1986), Detroit, Michigan
Leonard Richardson (1987), Asheboro, North Carolina
The Reverend George P. Robinson (1987), Winston-Salem, North Carolina
Norwood Robinson (1985), Winston-Salem, North Carolina
Beverly Small (1986), Elizabeth City, North Carolina
The Reverend Thomas B. Stockton (1985), High Point, North Carolina
Ted B. Sumner, Jr. (1985), Charlotte, North Carolina
A. Morris Williams, Jr. (1986), Villanova, Pennsylvania
Sherrill Williams (1985), Newton Grove, North Carolina






Among the many resources which support Duke's commitment to excellence in theological education, none is more important than the strong reputation which the Divinity School continues to enjoy as a school of the church. In the 58 years since its founding, more than 3,000 graduates have gone forth to serve in thousands of congregations around the globe. We regard that reputation as a sacred trust. We believe fulfilling that trust requires continuing boldness and imagination if we are to prepare students for ministries equal to the challenges of these perplexing times.

Duke's tradition of intellectual rigor in the service of the church continues unabated. With the start of the Fall 1984 semester, the Divinity School enrolled 392 students in its professional degree programs (M.Div., M.R.E. and Th.M.) and an additional 60 students in the M.A./Ph.D. program. Our students are men and women from 192 undergraduate schools, 22 denominations and 33 states. Women constitute 30% of the total enrollment, and black students constitute 10%. And at a time when many schools are being forced to lower their entrance requirements, the Divinity School continues to maintain its historical commitment to high standards. The quality of our student body has never been better.

While the accomplishments of its distinguished faculty and scholars, and an aggressive international exchange program earn it increasing prominence in American theological education and the ecumenical world, the Divinity School continues to enjoy strong regional, denominational and alumni support as well.

Finally, Duke's unique field education program emphasizes both remunerative employment and vocational preparation. The program's generous funding from the Duke Endowment makes it possible for our students to advance their competency in ministry while receiving substantial financial assistance.

These are some of the resources which account for Duke's margin of excellence and provide reason to believe that the Divinity School's ministry in the service of the church will not only continue, but endure.


Dennis M. Campbell
Dean

General Information



History

Duke University as it exists today developed from simple beginnings. Established in 1838, Union Institute became a normal college by 1851 and in 1859 was renamed Trinity College. In 1892 the college moved to Durham, North Carolina.

In 1924 James B. Duke established a trust fund for educational and charitable purposes. The chief beneficiary was Trinity College, which became Duke University. The purpose for establishing the trust was very clear: "I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical lines, is, next to religion, the greatest civilizing influence And I advise that the courses at this institution be arranged, first, with special reference to the training of preachers, teachers, lawyers, and physicians, because these are most in the public eye, and by precept and example can do most to uplift mankind" The School of Religion began its work in the academic year 1926-27, and formal exercises for its opening were held on 9 November 1926. In 1940 the name was changed to the Divinity School.

During its history the Divinity School has had outstanding teachers, scholars, and administrative leaders,* and its graduates have distinguished themselves by making significant contributions to the church and the world. In 1964 a program of expansion was begun, culminating in February 1972, when the Divinity School doubled its physical facilities and moved into a handsome new building.

The Role of the Divinity School

The Divinity School represents theological inquiry and learning within the greater University. By history and indenture, it stands within the Christian tradition, mindful of its distinctive lineage in and its continuing obligation to the United Methodist Church. The Divinity School, although United Methodist in tradition and dependency, receives students from many Christian denominations and offers its educational resources to representatives of the several communions who seek an education for church-related ministry. From its inception, it has been ecumenical in aspiration, teaching, and practice, as well as in its faculty. Educational policy has consistently aspired to foster a Christian understanding "truly catholic, truly evangelical, and truly reformed."

The principal purpose of the Divinity School is the professional education for the ministry, which in today's world is manifested in a variety of forms. Although the conventional and inherited styles of ministry are now undergoing change, the Divinity School curriculum continues to prepare students for informed and discriminating discharge of the historic offices of church and congregation through the ministry of word and sacrament, pastoral care, and teaching. The Divinity School believes these offices will remain, although the form and context of the local church may change.

With this in mind, the Divinity School tries to prepare students for the mature performance of their vocation. It hopes to develop in each graduate a disciplined intelligence, informed by sound learning and equipped for worthy professional service. Its resources are offered to students with a diversity of ministerial aims, although the school seeks, by recruitment and financial support, to prepare persons for ordi-

*Since the institution of the school in 1926, the following persons have served as Deans or Acting Deans: Edmund Davidson Soper, 1926-28; Elbert Russell, 1928-41; Paul Neff Garber, 1941-44; Harvie Branscomb, 1944-46; Gilbert T. Rowe, Acting Dean of the Faculty, 1946-47; Paul E. Root (elected in 1947 but died before assuming office); Harold A. Bosley, 1947-50; James Cannon III, Acting Dean 1950-51, Dean 1951-58; Robert Earl Cushman, 1958-71; Thomas A. Langford, 1971-81; Jameson Jones, 1981-82; Dennis M. Campbell, 1982—.

nation or lay professional vocations in the churches. In all its endeavors, the Divinity School aims to serve the Church, the world, and primarily the Lord of the Church.

The Relation of the Divinity School to Duke University

The Divinity School is an integral part of the University and shares fully in its activities, privileges, and responsibilities. The Sunday services in the University Chapel give Divinity School students each year an opportunity to hear several of the country's leading ministers. The University libraries make a rich collection of books and other materials easily accessible. Without paying additional fees, selected courses in the graduate and professional schools are open to Divinity School students, as well as the general, cultural, and recreational resources of the University.

Library Resources

Divinity School Library. The Divinity School Library contains a collection of more than 210,000 volumes in the field of religion and related disciplines and affords an unusual wealth of material for the seminary student. Although an integral part of the University's eleven-unit library system, which possesses more than 3,000,000 volumes, the Divinity School Library has its own separate facilities in the Divinity School Building. Its book collection is operated on the open stack system, and its reading rooms provide study facilities for students, space for the special reference collection in religion, and for the more than 600 religious periodicals to which the library currently subscribes.

Staffed by a librarian and a reference librarian trained in both theology and library administration, by a supporting staff of three persons, and by a number of student assistants, the Divinity School Library offers a variety of reference services to assist the student in selecting and locating materials. The staff, in cooperation with the faculty, maintains a book and periodical collection to support basic course work as well as advanced research in all major fields of religious studies.

The Divinity School Library is adjacent to the Perkins Library. The seminary student may use the resources and facilities of the Perkins Library, some of which include manuscripts, archives, public documents, newspapers, periodicals, microfilms, maps, rare materials (among which are eighty-one prized ancient Greek manuscripts), and reference assistance. There is a provision for borrowing books from the libraries of the University of North Carolina and other neighboring institutions.

Center for Studies in the Wesleyan Tradition

The Center for Studies in the Wesleyan Tradition was founded in 1979 and is supported by a permanent endowment of the Divinity School designated for its use. The center supports a wide variety of programs designed to advance teaching, research, and publication in Wesleyan history and theology.

Library. The Baker Collection is the largest and finest collection of Wesley and Methodist materials extant. Named for Professor Emeritus Frank Baker, the world's foremost authority on John Wesley, and Editor of the Bicentennial Edition of Wesley's Works, a project based at Duke Divinity School, the Baker Collection is an unparalleled resource.

Visiting Professors. The center brings distinguished visiting professors to teach in the Divinity School. Recently, Dr. David Stacey, Principal of Wesley College, Bristol, England, and Dr. José Miguez Bonino, Professor of Theology and Ethics at the Protestant Theological Seminary in Buenos Aires, Argentina served as visiting professor.

Visiting Scholars. The center makes research grants to scholars from around the world to work for various periods of time in the Divinity School. Among those who

have served recently are Bishop Ole Borgen, United Methodist Bishop of Sweden, Norway, Denmark, Finland, and Estonia, and Professor Morna Hooker, Lady Margaret Professor of Divinity, Cambridge University, England.

Visiting Lecturers. The center has an extensive program of visiting lecturers which exposes students and faculty of the Divinity School to leading figures in the Wesleyan tradition from throughout the world. Most recently these included: Professor Peder Borgen, University of Trondheim, Norway; Dr. Manfred Marquardt, the Methodist Theological Seminary, Reutlingen, West Germany; Dr. Rutiger Minor, the Methodist Seminary in East Germany; the Reverend Helmut Nausner, District Superintendent, Vienna, Austria; Professor Norman Young, Principal of Queens College, the University of Melbourne, Australia and Dean Walter Klaiher, Methodist Theological Seminary, Rentington, West Germany.

Publications. The center is committed to a program of scholarly publication. In 1983, support was given for preparation of a reader in theology in the Wesleyan tradition to be published in 1984.

Faculty Committee. Divinity School faculty related to the center include Professor Thomas A. Langford, Professor Geoffrey Wainwright, Professor Robert L. Wilson, Bishop W. Kenneth Goodson, and Professor Dennis M. Campbell, Dean and Chairman.

The Review of Books and Religion

Peguy's insistence that "everything begins in mysticism and ends in politics" seems an especially apt description of the increasingly complicated and fragmented world which confronts us as the twentieth century winds to its close. Yet the evidence suggests that the national opinion leaders who make up what Daniel Bell has called the "overculture" are blind to religion's influence in the world today, and ignorant of its power to shape politics, economics, and culture, both at home and abroad.

This growing distance between the dominant intellectual culture and society at large explains why key issues of religious concern are often either ignored or trivialized by secular media predisposed to view the role of religion in the affairs of this world with hostility, suspicion, or indifference.

Since its founding in 1971, the *Review of Books and Religion* has sought to correct this deficiency by monitoring religious publishing in America, and selecting from the more than 2,000 new titles published annually those books deemed most important for review and comment. For more than a decade, its broad ecumenical focus has made it unique in its field. It is the only publication offering timely and comprehensive coverage of the broad range of American religious thought and scholarship—Protestant, Catholic, and Jewish, conservative and liberal, popular and scholarly.

Convinced that the need for such a publication has never been greater, Duke Divinity School assumed ownership of the *Review of Books and Religion* in 1984, through the generosity of the founding editors, Iris V. Cully and Kendig Brubaker Cully. The monthly publication, which is circulated nationwide, is now edited and published at the Divinity School. We have taken on this responsibility with the aim of providing general readers, clergy, and scholars alike with one publication which can fulfill E. M. Forster's injunction "only connect" by providing a common forum for these often separated communities and help broaden public awareness of the relevance of the nation's principal religious resources to the perplexing problems of these difficult times. We are convinced that a healthy *Review* can also serve as a valuable aid to the continuing education of lay and clerical leaders in all the churches, a lively medium of exchange among the makers of ideas, and a significant tool for ecclesiastical and institutional librarians and other scholars.

Admissions



Requirements and Procedures

The Divinity School is a fully accredited member of the Association of Theological Schools and is one of thirteen accredited seminaries of the United Methodist Church. It considers candidates for admission who hold an A.B. degree, or its equivalent, from a college approved by a regional accrediting body.

Preseminary Curriculum. The Divinity School follows the guidelines of the Association of Theological Schools with respect to undergraduate preparation for theological study. In general, this means a strong background in liberal arts, especially the humanities. A well-rounded background in English language and literature, history, philosophy, psychology, religion, social science, and foreign languages is especially desirable.

Application Procedures for Master of Divinity and Master of Religious Education Programs. Application forms secured from the admissions office should be filed six to twelve months in advance of the intended date of enrollment. Ordinarily, no application for a degree program will be accepted after 15 May and 15 November for August and January enrollments, respectively. The student should provide the following supporting documents and information: (1) one copy of the official transcript from each college, university, or seminary attended sent directly to the Director of Admissions by the institution; (2) one supplementary transcript, sent as soon as possible, showing completion of work which was in progress when the earlier transcript was made; and (3) the names of five persons best qualified to judge the applicant as a prospective student in the Divinity School who will be contacted by the school for written letters of recommendation. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

Applicants are strongly urged to come for on-campus visits and interviews prior to final admission. A minimum of thirty days is required to process any application for a degree program.

Graduates of unaccredited senior colleges and universities may apply for admission but will be considered for admission only on a limited program basis.

Application Procedures for Master of Theology Program. Application forms can be secured from the admissions office and should be filed six to twelve months in advance of the intended date of enrollment. Ordinarily, no application for the Th.M. degree will be accepted after 15 May and 15 November for August and January enrollments, respectively. The student should provide the following supporting documents and information: (1) one copy of the official transcript from each college, university, or seminary attended sent directly to the Director of Admissions by the institution; (2) one supplementary transcript, sent as soon as possible, from the seminary showing completion of work which was in progress when the earlier transcript was made (if necessary); (3) the names of three seminary professors best qualified to judge the applicant as a prospective student in the Divinity School who will be contacted by the school for written letters of recommendation; (4) the name of one denominational official qualified to appraise the applicant's ministerial work who will be contacted by the school for a written letter of recommendation; and (5) scores from either the Graduate Record Examination or the Miller Analogies Test sent directly to the school. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

Additional Procedures for International Students. Fully qualified students from outside the United States are welcome to apply for admission to the Divinity School. In applying for admission the international student must, in addition to the information required of all students, submit with the application material: (1) if the student's

native language is not English, certification of English proficiency demonstrated by scores from the Test of English as a Foreign Language (TOEFL), administered through the Educational Testing Service in Princeton, New Jersey, (the Divinity School requires a score of 550 or higher on the TOEFL); (2) a statement of endorsement from an official of the student's national ecclesiastical body, affirming that ecclesiastical body's support for the student's pursuit of theological studies in the United States and welcoming the student into active ministry under its jurisdiction following the student's study in this country; and (3) a statement demonstrating financial arrangements for the proposed term at the Divinity School (estimated costs per calendar year are \$13,000*). *An international student must submit scores from the TOEFL, a financial statement, an endorsement by an official of an ecclesiastical body, and have all transcripts and five letters of recommendation sent to the Admissions Office of the Divinity School before the Divinity School will make any offer of admission.*

Admission Requirements. Those persons are encouraged to apply:

1. who have or will have been awarded a bachelor's degree from a regionally accredited college or university prior to their intended date of enrollment;
2. who have attained at least an overall B-(2.65 on 4.0 scale) academic average; and
3. who are committed to some form of ordained or lay ministry.

Applicants are evaluated on the basis of academic attainment, future promise for ministry, and vocational clarity and commitment.

Admission on Limited Program. Limited program is a special relation between the school and the student, designed to encourage and support academic achievement. Students may be admitted on limited program for a number of reasons including an undergraduate degree in a program other than liberal arts, an undergraduate degree from a nonaccredited college, or an undergraduate transcript that does not fully meet Divinity School standards.

Limited program means reduced schedules of work, with the amount determined by the Associate Dean for Curricular Affairs (ordinarily no more than three courses each of the first two semesters), and also includes a review of work at the end of each semester by the Committee on Academic Standing until limited program is lifted.

Admission as a Special Student. Special student status is a restricted category of admission for persons who do not have need of a degree program and who desire access to the rich offerings of the Divinity School curriculum for particular purposes. Special student status may be granted after a person has submitted an application and all transcripts of undergraduate academic work and when all three letters of recommendation have been received from listed references. Applications for special student status must be submitted at least thirty days prior to the intended date of enrollment. *Special students are ineligible for any form of financial assistance through the Divinity School.*

Admission Acceptance. Applicants are expected to indicate their acceptance of admission within three weeks and to confirm this with the payment of an admission fee of \$50. Upon matriculation, this fee is applied to the first semester tuition charge.

To complete admission students must provide a certificate of immunization and general health to the student health service. The admission office must also receive a final transcript verifying the conferral of the undergraduate (for the M.Div. and M.R.E.) or seminary (for the Th.M.) degree.

*Figures are based on 1982-83 charges and are subject to change.

Persons who do not matriculate at the time for which they were originally admitted forfeit admission unless they present a written request for postponement to the Director of Admissions and Student Affairs.

Transfer of Credit. Transfer of credit from theological schools accredited by the Association of Theological Schools is allowed by the Divinity School towards the Master of Divinity and Master of Religious Education degrees only. Credit from another institution will normally be limited to one-third of the total number of credits required for graduation by the Divinity School. In each case a letter of honorable dismissal from the school from which transfer is made is required along with a transcript of academic credits. Applicants for transfer into a degree program are evaluated on the same basis as other applicants.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct. The University wishes to emphasize its policy that all student are subject to the rules and regulations of the University currently in effect, or which are put into effect from time to time by the appropriate authorities of the University. Any student, in accepting admission, indicates willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

The Divinity School expects its students to participate in a communally shared concern for growth in life appropriate to Christian faith and to the dignity of their calling.

Readmission to Duke Divinity School

Persons seeking readmission to the Divinity School's degree programs must complete the following requirements: (1) submit a new application; (2) submit an additional statement detailing reasons for withdrawal and reasons for seeking readmission at this time, and describing activities and employment undertaken since withdrawal through the present; (3) submit the names of at least three persons willing to serve as references, one of which must be an ecclesiastical official; and (4) transcripts of all academic work undertaken since withdrawal from the Divinity School.

These new materials, supplemented by the individual's original application and Divinity School academic and field education files, will be reviewed by the members of the Admissions Committee for an admission decision. An interview with the Director of Admissions prior to the processing of the application for readmission is encouraged and may be required. Any questions about readmission procedures should be addressed to the Director of Admission. Applications for readmission will be evaluated on the basis of academic attainment, future promise for the ministry, and vocational clarity and commitment.

Community Life



Corporate Worship

One of the most important aspects of a program of training for Christian life is a vigorous, inspiring, and varied program of participation in corporate worship. This corporate life of the Divinity School is centered in York Chapel where three services are held weekly—a service of prayer on Tuesday, a service of preaching on Wednesday, and a service of word and table on Thursday. These services are led by members of the faculty, members of the student body, and guests. Services are voluntary but have been and will continue to be sources of inspiration and strength to the members of the community.

The Divinity School enjoys a particularly close relationship with Duke Chapel. Throughout the year, Divinity School administrators and faculty, as well as guests of national and international stature preach at Sunday morning worship services. Each year several or more of our students join the 200-plus member Duke Chapel Choir which provides choral music on Sunday mornings and special music programs throughout the academic year, including an annual Christmas performance of Handel's *Messiah*.

Divinity students and faculty also contribute to the leadership of the ministry of Duke Chapel by chairing and serving on standing committees: Faith and the Arts, Supportive Ministries, Worship, Prophetic Concerns, and Leadership and Development.

Living Accommodations

Town House Apartments. Duke University operates Town House Apartments primarily for graduate and professional school students. Others may be housed if vacancies exist. The setting of these apartments provides single graduate students a comfortable, home-like atmosphere as an alternative to residence halls. Sixteen of the thirty-two air-conditioned apartments are equipped for two students, and the remaining sixteen units are equipped for three students.

Central Campus Apartments. Duke University operates a 500-unit housing facility known as Central Campus Apartments. The complex provides basic housing for married graduate students, and single and married students in nondegree allied health programs. Assignments are made on a first-apply, first-assigned basis.

For single students one-bedroom and two-bedroom apartments are fully furnished. The apartments for married students include a few efficiencies and a number of one-, two-, and three-bedroom units in which the kitchen, living room, and first bedroom are basically furnished. These apartments are equipped in such a way as to

provide economy and convenience to eligible married students while allowing for individuality.

Application Procedures. When students are informed of their acceptance to the Divinity School, they will also receive a form on which to indicate their preference for University housing. This form should be returned to the Department of Housing Management. Detailed information on the types of accommodations, and application forms, will be forwarded to the accepted student. However, if additional information is desired prior to a student's acceptance, please write to the Department of Housing Management, Duke University, Durham, North Carolina 27706.

Off-Campus Housing. The Department of Housing Management maintains lists of rental apartments, rooms, and houses provided by Durham property owners or real estate agents who will agree not to discriminate in the rental of property because of race, sex, creed, or nationality of a prospective tenant. These lists are available in the Central Campus office. Off-campus rental properties are not inspected or approved, nor does the University or its agents negotiate with owners for students, faculty, or staff. Many divinity students choose to live in off-campus apartment complexes because of their proximity to the school. A listing of such complexes can be secured from the Department of Housing Management of the University or from the Office of Admissions and Student Affairs of the Divinity School.

Food Services. Food service facilities located throughout the Duke campus include both board plan and cash operations. Graduate and professional students are welcome to eat in any of the board plan cafeterias at guest meal prices or they may participate voluntarily in any of the point plans. Details are available from the Food Services Business Office, 106 West Campus Union Building. Board plans in the Blue and White Room Cafeteria and the East Court Cafeteria provide participants and their guests with unlimited seconds-style meals throughout the week at set prices. Dining facilities on the West Campus include a cafeteria with multiple-choice menus, the Oak Room with table service, and the Cambridge Inn with fast foods and beverages. The Bryan Center has a snack bar and a Rathskeller, both open all week, morning through late evening. East Campus has cafeteria service and a snack bar. Trent Drive Hall has a public cafeteria and Gradel's, a snack bar/delicatessen. The Sprout is a salad and soup bar open for lunch Monday through Friday. Duke University Food Services is the largest student employer on campus, and hires students in almost every food operation. A listing of open positions and areas is available from the Personnel Office, 106 West Campus Union Building.

Student Health

One of the prerequisites for gaining the most from the University experience is a sense of well-being. The aim of the University health service is to provide medical care and health advice necessary to help the student enjoy being a part of the University community. To serve this purpose, both the University health service clinic and the University infirmary are available for student health care needs. A separate fee for this service is assessed.

The main components of the health service include the University health service clinic, located in the Pickens Building on West Campus, and the University infirmary on the East Campus. Emergency transportation, if required, can be obtained from the Duke campus police. Residential staff personnel should be consulted whenever possible for assistance in obtaining emergency treatment.

The facilities of the University health service clinic are available during both regular and summer sessions to all currently enrolled full-time students. The facilities of the University infirmary are available during the regular sessions from the opening of

the University in the fall until graduation day in the spring to all currently enrolled full-time students.

The University has made arrangements for a Student Accident and Sickness Insurance Plan to cover all full-time students for a twelve-month period. For additional fees a student may obtain coverage for a spouse or spouse and child. Although participation in this program is voluntary, the University expects all graduate students to be financially responsible for medical expenses above those covered by the University student health program through the University accident and sickness policy, a private policy, or personal financial resources. Students who have equivalent medical insurance or wish to accept the financial responsibility for any medical expense may elect not to take the Duke plan by signing a statement to this effect. Each full-time student in residence must purchase this student health insurance or indicate the alternative arrangement. The student accident and sickness insurance policy provides protection twenty-four hours per day during the full twelve-month term of the policy for each student insured. Students are covered on and off campus, at home, or while traveling between home and school and during interim vacation periods. Term of the policy is from opening day in the fall. Coverage and services are subject to change each year as deemed necessary by the University in terms of costs and usage.

All full-time and part-time degree candidate students are required to enroll in the Student Accident and Sickness Insurance Policy unless they show evidence by completing the appropriate waiver statement contained on the remittance form of the University invoice indicating that they are covered by other generally comparable insurance. This statement requires that the name of the insurance company and the policy number be indicated as well as the signature of the student or parent. Also, note this requirement may be waived by signing the appropriate space on the University invoice indicating willingness to assume the medical costs of any sickness or accident.

Married students are expected to be financially responsible for their dependents, providing for hospital, medical, and surgical care, since their dependents are not covered at any time by student health.

The resources of the Duke University Medical Center are available to all Duke students and their spouses and children. Charges for any and all services received from the Medical Center are the responsibility of the student as are the charges for services received from physicians and hospitals not associated with Duke University.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) is a component of student services which provides a coordinated, comprehensive range of counseling and developmental services to assist and promote the personal growth of Duke students. The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide evaluation and brief counseling/psychotherapy regarding a wide range of concerns, including such issues as self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. While students' visits with counselors are usually by appointment, a walk-in consultation service is provided two hours each weekday for students with urgent personal concerns.

Each year CAPS offers a series of self-development seminars focusing on skills development and special interests. These explore such interests as stress management, assertiveness training, career planning, couples' communication, and study skills. Interested students may call or come by CAPS for further information.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admission tests and professional licensure and certification examinations. The staff is also available to the entire University community for consultation and educational activities in student development and mental health issues affecting not only individual students but the campus com-



munity as a whole. They work with campus personnel, including administrators, faculty, student health staff, religious life staff, resident advisers, and student groups, in meeting needs identified through such liaisons. Staff members are available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If a student desires that information be released to anyone, written authorization must be given by the student for such release.

There are no charges for initial evaluation, brief counseling/psychotherapy, or self-development seminars. If appropriate, referral may be made to other staff members or a wide variety of local resources.

Appointments may be made by calling 684-5100 or coming by the office in 214 Old Chemistry Building, West Campus, between 8:00 A.M. and 5:00 P.M. Monday through Friday. If a student's concern needs immediate attention, that should be made known to the secretary, and every effort will be made to arrange for the student to talk with a staff member at the earliest possible time.

Motor Vehicles

Each student possessing or maintaining a motor vehicle at Duke University must register it at the beginning of the academic year in the security office at 2010 Campus Drive. If a motor vehicle is acquired and maintained at Duke University after academic registration, it must be registered within five calendar days after operation on the campuses begins. Resident students are required to pay an annual fee of \$30 for each motor vehicle or \$15 for each two-wheeled motor vehicle. Students first registering after 1 January are required to pay \$20 for a motor vehicle or \$10 for a two-wheeled motor vehicle.

At the time of registration of a motor vehicle, the following documents must be presented: the state vehicle registration certificate, a valid driver's license, and satisfactory evidence of automobile liability insurance coverage with limits of at least \$10,000 per person and \$20,000 per accident for personal injuries, and \$5,000 for property damage, as required by the North Carolina motor vehicle law.

If a motor vehicle or a two-wheeled motor vehicle is removed from the campus permanently and the decal is returned to the traffic office prior to 20 January there will be a refund of \$15 for a motor vehicle and \$7.50 for a two-wheeled motor vehicle.

Student Activities and Organizations

In the absence of common living and dining accommodations, community life in the Divinity School centers around a number of organizations and activities. The richness of life prevents more than a very selective listing of activities and organizations.

A primary center for community is a morning chapel service held every Tuesday, Wednesday, and Thursday in York Chapel while school is in session. Faculty and students share joint responsibility for these services. Other worship opportunities available through Duke Chapel include morning prayer services on weekdays during the school year and regular Sunday services all year long.

A number of students find both intimacy and fellowship in one of several informal groups whose major purpose is to provide students with opportunities to express and share personal, professional, and spiritual developments with each other in weekly meetings on the campus and at home.

The Student Association. The officers of the Student Association are elected and serve as an executive committee for conduct of the business of the Representative Assembly.

The purpose of the association is to channel the interests and concerns of Divinity School students to the following ends:

1. to provide student programs and activities;
2. to represent students to the faculty and administration;
3. to represent students with other Duke University organizations; and
4. to represent students in extra-University affairs.

The Community Life Committee of the Student Representative Assembly annually plans at least six community-wide events for students and faculty. Weekend retreats present students with an opportunity to become better acquainted with each other and with faculty, and to explore matters of personal, professional, or spiritual concern. Dialogues on ministry occurring through the year help introduce students to practicing ministers and their personal, professional, and spiritual struggles and growth.

Divinity School Choir. A student organization of long standing is the Divinity School Choir. Membership is open to all qualified students. The choir sings regularly for chapel and at special seasonal programs and services. New members are chosen by informal auditions which are arranged for all who are interested.

Divinity Spouses. Divinity Spouses is an organization which offers the spouses of regularly enrolled students opportunities for sharing interests and concerns. The spouses' program, which includes topical monthly meetings with a variety of speakers, small interest groups, and special projects, seeks to encourage and provide ways for spouses to become a more integral part of the Divinity School community. Monthly meetings are open to all persons. A favorite event each year is a progressive dinner for couples involving the visitation of a number of faculty homes.

The Black Seminarians' Union. This is an organization of black students whose major purpose is to insure the development of a theological perspective commensurate with the Gospel of Jesus Christ and relevant to the needs of black seminarians and the black church, to improve the quality of life academically, spiritually, politically, and socially in the Divinity School.

The Student Pastors' Association. This association provides students actively serving their denominations in an ordained or lay capacity opportunity to meet, to share, to plan, and to act on their common needs and concerns as those serving the church as senior and associate pastors while in school.

Women's Center. The Women's Center seeks to serve the entire Divinity School community through a focus on the special needs and contributions of women in ministry in and to the Church and society today. The office, coordinated by two divinity women students, is a resource center for the whole community in addition to a support and action center for women in particular.

Theological Students' Fellowship. This organization provides fellowship, scholarship resources, and weekly prayer groups for all students interested in the evangelical tradition. Evening meetings with dinner, singing and prayer, a weekly sharing group at the school, and a monthly lecture series provide integration of academic and spiritual aspects of seminary life.

Cultural Resources

Divinity School students enjoy access to the many resources of the University community, particularly in the area of the performing arts. Two active campus film societies sponsor screenings of major motion pictures on Saturday and Sunday evenings. Other films of a classical nature are offered on Tuesday through Thursday

nights, with free films for children scheduled every other Saturday morning. Opportunities in music, dance, and drama are provided by the following: the Duke Artists Series, Broadway at Duke, the Chamber Arts Society, Hoof 'n Horn, the Duke University Collegium Musicum, Duke Players, Duke Dance, the Duke University Symphony Orchestra and the Wind Symphony, the Duke University Jazz Ensemble, the Ciompi Quartet, Dance Black, and the Modern Black Mass Choir, among others.

Athletic Programs

In addition to unrestricted access to all University athletic and recreational facilities, divinity students enjoy other benefits from Duke's commitment to college athletics. The University is a member of the Atlantic Coast Conference of the National College Athletic Association, and offers intercollegiate competition in a variety of sports. Special admissions rates to football and basketball games are available to graduate and professional students. Additionally, the University supports a strong intramural program in which the Divinity School participates enthusiastically. In recent seasons the school has fielded teams in football, men's, women's, and co-rec basketball, volleyball, and soccer.



Financial Information



Fees and Expenses

Estimated Living Expenses. The total cost for a student to attend the Duke Divinity School varies according to individual tastes and requirements; however, experience indicates that a single student may expect to spend a minimum of \$10,450 for nine months and a married couple may expect to spend a minimum of \$15,000 for twelve months.

Housing Fees. Estimated minimal on-campus housing cost for a single student will be approximately \$2,000 during 1985–86. An efficiency apartment for a married couple on campus will cost approximately \$373 per month for the academic term.

Housing fees are subject to change prior to the new academic year. A \$100 deposit is required on all reservations.

Rates for Central Campus Apartments will be quoted to applying students upon request to the manager of apartments and property. Refunds on housing fees will be made in accordance with the established schedules of the University.

Master of Divinity and Master of Religious Education Candidates. The table below lists basic minimum expenditures. In addition to the fees cited here, there is an admission fee of \$50 which is applied to the first term bill and a room deposit of \$100. See relevant sections on admissions and housing for full details.

	<i>Per Semester</i>	<i>Per Year</i>
Tuition—M.Div. and M.R.E.	\$2,300	\$4,600
Student Health Fee	95	180
Approximate Cost of Meals	900	1,800
Student Representation Association Fee	8	16

Tuition will be charged at the rate of \$575 per course. The figures shown are for a program carrying eight courses per year. Students will be charged for additional course enrollments.

Master of Theology Candidates. A student who is a candidate for the Th.M. degree will be liable for tuition on the basis of eight courses at the rate of \$575 per course. All other costs and regulations for the Th.M. degree are the same as those for the M.Div. and M.R.E. degrees. Th.M. students are not ordinarily eligible for student financial aid.

Special Student. A special student is one who is enrolled for academic credit, but who is not a candidate for a degree at that time. The tuition will be charged on a course basis. Other costs and regulations are the same as those for the M.Div. and M.R.E. candidates. No financial aid is available.

Audit Fee. Anyone seeking to audit a course in the Divinity School must, with the consent of the instructor concerned, secure permission from the Associate Dean's office. In accordance with the general University practice, a fee of \$85 per course will be charged all auditors who are not enrolled as full-time students.

Athletic Fee. Divinity School students may secure admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of the athletic fee of \$75 per year plus any federal tax that may be imposed. The fee is payable in the fall semester.

Payment and Penalty. Monthly invoices for tuition, fees, and other charges will be sent by the Bursar's office which are payable by the invoice due date; no deferred payment plans are available. As a part of the agreement of admission to Duke University a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and also certain restrictions as stated below will be applied.

If payment in the amount of the total amount due on the student invoice is not received by the invoice due date, a penalty charge will be accrued from the billing date of the invoice. The penalty charge will be at a rate of $1\frac{1}{3}$ percent per month (16 percent per annum) applied to the past due balance on the student invoice. The past due balance is defined as the previous balance less any payments and credits received during the current month and also any student loan memo credits, related to the previous balance, which appear on the invoice.

An individual will be in default of this agreement if the total amount due on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Refunds of tuition and fees are governed by the following policy:

In the event of death a full tuition and fees refund will be granted.

In all other cases of withdrawal from school tuition will be refunded according to the following schedule: withdrawal before the opening of classes—a full refund; withdrawal during the first or second week—80 percent; withdrawal during the third through fifth week—60 percent; withdrawal during the sixth week—20 percent; withdrawal after the sixth week—no refund. No refund will be granted for reduction in course load.

Tuition or other charges paid from grants or loans will be restored to those funds on the same prorated basis and will be refunded to the student or carried forward.

These regulations apply to all Divinity School students—degree candidates, special students, and auditors.

Debts. No records are released, and no students are considered by the faculty as candidates for graduation, until they have settled with the Bursar for all indebtedness. Bills may be sent to parents or guardians provided the Bursar has been requested in writing to do so. Failure to pay all University charges on or before the times specified by the University for the semester will bar the student from class attendance until the account is settled in full.

Motor Vehicle Registration Fee. There is a \$30 registration fee for all automobiles (\$15 for two-wheeled motor vehicles) used on campus. For specifics see the chapter "Community Life."

Student Financial Aid

A student should select a school on the basis of educational opportunity. At the same time financial consideration will be a legitimate and often pressing concern.

Each student should formulate at least a tentative plan for financing the entire seminary education. Although the exact method of financing the full theological degree may not be assured at the beginning, a student should have a clear understanding of the expenses and available sources of income for the first year and the assurance that there exist ways of financing subsequent years.

The Committee on Financial Aid will counsel the student concerning financial needs and possible resources. There is constant review of available resources in order to assist the greatest number of students. However, the basic financial responsibility belongs to the student who is expected to rely upon personal and family resources and earning and borrowing power. Other resources may include the student's church, civic groups, foundations, and resources of the school which may include grants, loans, field education grants, and employment. It is the goal of the financial aid office to assist each student in planning a financial program so that as little indebtedness as possible will be incurred.

The total amount available through the Divinity School is limited. Further, the conditions set forth by the individual or institutional donors determine the circumstances under which the grants can be made. Almost without exception the donors require ecclesiastical endorsement and/or declaration of ministerial vocational aim.

The principles regarding the disbursement of financial aid are as follows:

1. Financial aid is recommended on the basis of demonstrated need. All students must file an application which substantiates needs and provides full information on potential resources. This is essential in order to make Divinity School funds available to the greatest number of students. In order to receive assistance in any form from the Divinity School, a student must be enrolled for at least three courses per semester and maintain an overall academic average of 2.0 or higher.
2. Grants will be made within the limits of the conditions set forth governing each source.
3. The conditions at the beginning of the academic year determining financial needs shall be the governing criteria for the year. Financial aid programs are set up on a yearly basis, except for those students who may enter the second semester and/or those few whose status may change.
4. Financial aid grants are made on a one-year basis. The assistance may consist of scholarships, loans, tuition grants, grants-in-aid, field education grants, and employment, which may be worked out in various combinations on a yearly basis. A new application must be filed each year.
5. Grants in aid, or "tuition grants" are ballooned for the first year of study to assist students as much as possible through their transitional first year at Duke. Consequently grants for the second and third years of study will be somewhat less than those awarded for the critical first year.
6. Application for financial aid may be made by entering students at time of admission or currently enrolled students by December 1. Notification will be given after committee approval. Student pastors serving United Methodist churches can be notified after the pastoral charge and Annual Conference determine salary schedules. Financial aid applications for students anticipating fall matriculation are reviewed beginning the prior December. Applications for assistance will not be accepted after June 1 for August enrollment or after December 15 for January enrollment.
7. Ordinarily financial aid is not available beyond six semesters (eight for pastors on reduced load).
8. Students who have questions about the Divinity School's response to their financial aid request should first speak with the financial aid secretary. Where

desired, students may file an appeals form for full review by the financial aid appeals committee.

9. Special students and Th.M. students (with the exception of one international scholar annually) are not eligible for any form of financial assistance from the Divinity School. Th.M. students are eligible to apply for denominational and federal loans.

Financial Resources

Personal. In order that both the church and the Divinity School may be able to extend the use of their limited funds to as many students as possible, a student who desires a theological education should be willing to defray as far as possible the cost of such an education. Resources may include savings, earnings, and gifts, support or loans, and if married, earnings of a spouse. In calculating anticipated income, the student first considers personal resources.

Church. Many local churches and conferences or other governing bodies provide gifts and grants for theological education, such as ministerial education funds which provide grants and/or service loans to theological students. The student makes application to the home church, Annual Conference, Presbytery, or other governing body. The financial aid office cooperates with these church agencies in making recommendations and in handling the funds. *United Methodist students and others must be under the care of the appropriate church body to be eligible for church support.* The school cannot compensate for a student's indisposition to receive church funds when such are available on application through the Annual Conference Ministerial Education Fund or other agencies.

The Divinity School, as a member school of the Association of United Methodist Theological Schools, takes cognizance of and subscribes to recommended policy and practice regarding the administration of United Methodist Church funds for student financial aid as adopted by the association, 1 June 1970, and as bearing upon tuition grants, as follows:

Resources for tuition grants, scholarships or the like are primarily available to students with declared vocational aims leading to ordination or recognized lay ministries and supported by commendation or endorsement of appropriate church representatives. At the same time, we believe that consideration for a tuition grant may be accorded to students who adequately indicate conscientious concern to explore, through seminary studies, a recognized church-related vocation. Finally, it is our judgment that, where the above-mentioned conditions are deemed to be absent respecting a candidate for admission, the decision to admit such a candidate should be without the assurance of any tuition subsidy deriving from church funds. (AUMTS Minutes, 1 June 1970.)

Divinity School Scholarships. A limited number of scholarships are available to encourage qualified students to pursue their preparation for the Christian ministry.

Scholarships for Academic Merit. Each year the Divinity School awards ten scholarships to entering junior students on the basis of academic excellence in their undergraduate programs and promise for Christian ministry. The specific amount of a scholarship for academic merit will depend upon a student's demonstrated financial need and will not exceed a maximum \$4,000.

Ten scholarships for academic achievement are given for the middler and senior years of study. These awards go to those students with the greatest promise of service to the Church and highest academic achievement. The scholarship ranges up to \$4,000 in value, depending upon the recipient's *demonstrated* financial need, and academic course load.

The Dean's Scholarship. The Dean's scholarships will be awarded to at least ten recipients each year. These persons must represent strong promise for Christian ministry, academic achievement, and demonstrated financial need. Factors which will be taken into account are ethnic origin, missional responsibilities for the Church at

home and abroad, and special denominational needs. The specific amount of the scholarship will be based upon demonstrated need and may go up to \$3,500 per year. The scholarship is renewable for two years assuming continued academic attainment, development of ministerial promise, and demonstrated financial need.

International Student Scholarships. In cooperation with the Crusade Scholarship Committee of the United Methodist Church and other authorized church agencies, students are selected and admitted to courses of study. Scholarships for such students are provided from the Lewis Clarence Kerner Scholarship Fund and from individual churches and private philanthropy.

Tuition Grants. These are available in amounts commensurate with demonstrated need as adjudged by the Committee on Financial Aid. Entering students may apply, on notice of admission, by submitting the financial aid application to the Office of Financial Aid. Enrolled students may apply by annual renewal of their financial aid request. Because of the purpose and attendant educational objectives of the school, resources for tuition grants are primarily available to students with declared aims leading to ordination or recognized lay ministries.

Field Education Grants. Varying amounts ranging from \$1,600 (winter) to \$3,900 (summer) are made available through the Divinity School to students who choose to participate in the field education program. The Offices of Field Education and Financial Aid work together in determining placement and grant amount. This program includes the summer interns, winter interns, and student pastors. See full description under the section on field education.

Duke Endowment Student Pastor Grants. United Methodist students serving under episcopal appointment as student pastors in the state of North Carolina may qualify for tuition assistance up to \$1,875 through the Duke Endowment. The Financial Aid Committee will determine student eligibility for such assistance after appointments are read at the meetings of the two North Carolina United Methodist Annual Conferences.

Loans. Loan funds held in trust by the University, as well as United Methodist student loans and funds supplied by the federal government through the National Defense Education Act of 1958 are available to qualified students. The application must be submitted by 1 July.

Unless otherwise indicated, all correspondence concerning financial aid should be directed to: Financial Aid Office, The Divinity School, Duke University, Durham, North Carolina 27706.

Employment. Students or spouses desiring employment with the University should apply to the Director of Personnel, Duke University. Students or spouses make their own arrangements for employment either in the city of Durham or on campus.

Special Funds

Certain special funds have been established, the income from which is used to provide financial aid through scholarships and field education grants for students wishing to secure training in preparation for Christian ministry. The resources listed below include endowed funds and funds which have a variety of purposes.

Alumni Scholarship Fund. This fund was established in 1976 by the alumni of the Divinity School to provide financial support for ministerial candidates.

R. Ernest Atkinson Legacy. This legacy was established in 1952 under the will of the Reverend R. Ernest Atkinson, Trinity College Class of 1917, Richmond, Virginia.

M. M. Brabham Scholarship and Loan Fund. This fund was established in 1981 by Sara K. Brabham in memory of her father, the Reverend Mathew Moye Brabham; her mother, Fannie Cannon Brabham; and her sisters, Maud Brabham and Mary Moey Brabham. The fund is administered on behalf of St. Paul United Methodist Church, Ninety-six, South Carolina.

Fred W. Bradshaw Fund. This fund was established by Fred W. Bradshaw of Charlotte, North Carolina, to be utilized for the enrichment of the educational program of the Divinity School, especially to support distinguished visiting scholars and outstanding students.

Emma McAfee Cannon Scholarship. This scholarship was established in 1969 by Bishop William R. Cannon in memory of his mother, Emma McAfee Cannon, and is designated to assist students from the North Carolina Annual Conference of the United Methodist Church who are studying for the pastoral ministry and planning to spend that ministry in the North Carolina Conference.

Kenneth Willis Clark Fund. This fund was established in 1984 by Mrs. Adelaide Dickinson Clark in memory of her husband, Kenneth W. Clark, professor of New Testament in the Divinity School, 1931-67. It provides for distinguished lectureships in New Testament studies and textual criticism.

James T. Cleland Endowment Fund. This fund was established by friends and students of James T. Cleland to create a Chair of Preaching in his honor. He was Dean of the Duke University Chapel from 1955 to 1973 and Professor of Preaching in the Divinity School.

E. M. Cole Fund. This fund was established in 1920 by Eugene M. Cole, a United Methodist layman of Charlotte, North Carolina.

Lela H. Coltrane Scholarship. This scholarship was established in 1980 by Mrs. David S. Coltrane of Raleigh, North Carolina, and friends of Mrs. Coltrane.

Robert Earl Cushman Endowment Fund. This fund was established in 1980 to create a professorship in honor of Robert Earl Cushman, Dean of the Divinity School, 1958-71.

Dickson Foundation Awards. These awards were established by the Dickson Foundation of Mount Holly, North Carolina, to provide assistance to students who demonstrate financial need and superior ability. Preference is given to children of employees of American and Efird Mills and its subsidiaries; to residents of Gaston, Caldwell, and Catawba Counties; and to North Carolinians.

The Duke Endowment. Among the beneficiaries of the Duke Endowment, established in 1924, are the rural United Methodist churches of the two North Carolina Conferences. Under the Maintenance and Operation Program, Field Education Grants are available for Duke Divinity School students to serve in rural United Methodist churches under the Endowment and Field Education Program.

Henry C. Duncan Fund. The Village Chapel in Pinehurst, North Carolina, established this fund in 1982 in honor of its pastor, Chaplain Henry C. Duncan, a member of the Divinity School Class of 1949.

N. Edward Edgerton Fund. This fund was established in 1939 by N. Edward Edgerton, Trinity College Class of 1921, of Raleigh, North Carolina.

Will Ervin Scholarship Fund. An endowment established by Will Ervin in 1980 and administered by the Richlands United Methodist Church provides support for students preparing for Christian ministry.

George D. Finch Scholarship Fund. This fund was established in 1972 by George David Finch, Trinity College Class of 1924, of Thomasville, North Carolina.

W. Kenneth and Martha O. Goodson Fund. This fund was established in 1981 to honor Bishop Goodson, Divinity School Class of 1937 and retired Bishop of the United Methodist Church, and Mrs. Goodson.

James A. Gray Fund. In 1947 James A. Gray of Winston-Salem, North Carolina, presented this fund to the Divinity School for use in expanding and maintaining its educational services.

P. Huber Hanes Scholarship. This scholarship was established by the late P. Huber Hanes of Winston-Salem, North Carolina, Trinity College Class of 1900, as a scholarship fund for Duke University, a portion of which is used to provide financial assistance for Divinity School students.

Richard R. Hanner, Jr. Scholarship. This scholarship was established in 1973 by friends of the late Richard R. Hanner, Jr., Trinity College Class of 1953, to support advanced work in Christian education.

Russell S. and Julia G. Harrison Scholarship Fund. This fund was established in 1980 by Russell S. Harrison, Divinity School Class of 1934, and his wife Julia G. Harrison. The income is for support of persons from the North Carolina Conference of the United Methodist Church preparing for ordained ministry as local church pastors.

Margaret Blount Harvey Fund. This fund was established in 1982 by C. Felix Harvey and Margaret Blount Harvey of Kinston, North Carolina.

Hebrew Evangelization Society Scholarship. The Hebrew Evangelization Society, Inc., founded in 1931 by Dr. A. U. Michelson, provides two full-tuition scholarships each year.

Franklin Simpson Hickman Memorial Fund. This fund was established in 1966 by Mrs. Veva Castell Hickman as a memorial fund in memory of her husband, who served as Professor of the Psychology of Religion, the Dean of the Chapel of Duke University, and the first preacher to the University. The income of the fund supports a regular visiting lecturer in preaching and provides financial aid to students who wish to specialize in the psychology of religion.

George M. Ivey Scholarship Fund. This fund was established in 1948 by a gift of George M. Ivey, Trinity College Class of 1920, of Charlotte, North Carolina.

George Washington Ivey Professorship. With initial funding by the Western North Carolina Conference of the United Methodist Church and later funding by George M. Ivey, George M. Ivey, Jr., Leon Ivey, and the Ivey Trust, the George Washington Ivey Chair is the oldest named professorship in the Divinity School.

Jameson Jones Memorial Fund. Established in 1982 by a bequest and memorial gifts following the untimely death of Jameson Jones, Dean of the Divinity School, 1981-82, this fund provides for the enrichment of programs and study opportunities.

Charles E. Jordan Scholarship Fund. This fund was established in 1969 by the family of Charles E. Jordan, former Vice-President of Duke University.

Amos Ragan Kearns Professorship. A gift from the late Amos Ragan Kearns was designated to establish a Chair in Religion.

Lewis Clarence Kerner Scholarship. This fund was established in 1959 by Beatrice Kerner Reavis of Henderson, North Carolina, in memory of her brother and designated for the assistance of native or foreign-born students preparing for service in world Christian mission.

Carl H. and Mary E. King Memorial Fund. This fund was established in 1976 by friends and family and is to be used for students preparing for the parish educational ministry.

John Haden Lane Memorial Scholarship. This fund was established in 1968 by the family of John H. Lane to provide support for education in Christian ministry including chaplaincy and other specialized work.

Thomas A. and Ann Marie Langford Fund. This fund was established in 1981 in honor of Dr. Thomas A. Langford, Dean of the Divinity School, 1971–81, and Mrs. Langford.

Laurinburg Christian Education Fund. This fund was established in 1948 by members of the First United Methodist Church, Laurinburg, North Carolina.

John Joseph Lewis Fund. This fund was established in 1982 by Marion Smith Lewis, Trinity '16, of Charleston, South Carolina to honor his father, a circuit riding Methodist preacher.

Dr. D. M. Litaker Scholarship. This scholarship was originally established by Charles H. Litaker in 1946 in honor of his father, Dr. D. M. Litaker, Trinity College Class of 1890, and was specified for the Divinity School in 1977 by the Litaker family. The income is for support of persons preparing for ministry in the Western North Carolina Annual Conference of the United Methodist Church.

Robert McCormack Scholarship. This fund was established by the Trustees of the Duke Endowment to honor Robert McCormack, Chairman of the Board of the Duke Endowment at the time of his death in 1982.

Myers Park Scholarship Fund. This fund was established in 1948 by members of the Myers Park United Methodist Church, Charlotte, North Carolina.

W. Fletcher Nelson Scholarship. This fund was established in 1980 by friends of W. Fletcher Nelson, Duke Divinity School Class of 1930, of Morganton, North Carolina.

W. R. Odell Scholarship. This scholarship was established in 1946 by the Forest Hills United Methodist Church, Concord, North Carolina.

The Parish Ministry Fund. This fund was established in 1968 to provide continuing education opportunities for selected parish ministers and lay leaders from the Western North Carolina Conference of the United Methodist Church. The fund sponsors seminars, short study courses, and makes special grants for full-time study leaves. The program is administered by the Divinity School under the direction of the Parish Ministry Fund's Board of Directors.

Emma Leah Watson and George W. Perrett Scholarship. Established in 1984 by Mrs. George W. Perrett, this fund provides scholarships for students preparing for the parish ministry.

Cornelius Miller and Emma Watts Pickens Memorial. This fund was initiated in 1966 by the Pickens brothers to honor their parents. Income provides assistance to the Divinity School Media Center.

William K. Quick Endowment Fund. This fund was begun in 1981 by Mr. and Mrs. Stanley S. Kresge to establish a Chair in Methodist Studies to be named for their pastor, William Kellon Quick, member of the Divinity School Class of 1958.

Gilbert T. Rowe Memorial Scholarship Fund. This fund was established in 1960 through the generosity of Divinity School alumni and friends of the late Professor of Systematic Theology.

Elbert Russell Scholarship. This scholarship was established in 1942 by the Alumni Association of the Divinity School in honor of the late Dean of the Divinity School and Professor of Biblical Theology.

Hersey E. and Bessie Spence Fund. A gift from the estate of Hersey E. and Bessie Spence was designated to establish a Chair in Christian Education.

Hersey E. Spence Scholarship. This scholarship was established in 1947 by the Steele Street United Methodist Church of Sanford, North Carolina, in honor of their former pastor and late professor in the Divinity School.

David Johnson and Mary Woodson Sprott Fund. This fund was established in 1982 by the Sprott family of Winter Park, Florida.

Earl McCrary Thompson Scholarship. This scholarship was established in 1974 in honor of the late Earl McCrary Thompson, Trinity College Class of 1919.

Wilson O. and Margaret L. Weldon Fund. This fund was established in 1983 to honor Dr. Weldon, Divinity School Class of 1934 and trustee-emeritus of Duke University, and Mrs. Weldon.

A. Morris and Annabel Williams Fund for Parish Ministry. Established in 1983 by Mr. and Mrs. A. Morris Williams, Jr., this fund honors A. Morris Williams, Divinity School Class of 1932, and the late Mrs. Williams. It is designated for scholarships, continuing education, and creative program support for persons committed to Christian ministry through the local church.

The United Methodist Church. The United Methodist Church makes a substantial contribution to the Divinity School by designating a percentage of its Ministerial Education Fund and World Service Offerings for theological education. The general Board of Education makes available annually two national United Methodist Scholarships having a cash value of \$750 each.

Dempster Graduate Fellowships. The United Methodist Board of Education offers two fellowships each year for graduates of United Methodist theological schools who are engaged in programs of study leading to the Ph.D. degree in religion. A number of Divinity School graduates have held these fellowships.

Field Education



A Ministerial Development Program

As the clinical dimension of theological education, field learning is designed to: (1) help students develop vocational identity as ministers by providing experience with a variety of ministry tasks; (2) provide a ground for the testing and reconstruction of theological concepts; (3) develop the ability to do critical and reflective thinking by relating theory and experience; (4) help students develop ministry skills to achieve an acceptable level of professional competence; (5) integrate academic studies, personal experiences, and critical reflection into a personal spiritual foundation that produces a confident and effective ministry.

Field Education Credit Requirements

Two units of approved field education placement are required for graduation in the Master of Divinity degree program. A unit is defined by one term placement, either a summer term of ten weeks or twelve weeks or a winter term of thirty weeks at fifteen hours per week. To be approved, the field setting must provide ministerial identity and role, distinct ministerial tasks, qualified supervision, a service-learning covenant, regular supervision conferences, and effective evaluation. Each unit also requires completion of the appropriate field education seminar concurrent with or immediately following the field placement.

The seminar required for each unit of credit will include the use of case material prepared by the student and critical reflection upon the nature and task of ministry as it is experienced in an approved field setting. Seminars will be led by faculty and ministers. The field seminars must be taken in sequence: FE I, Ministerial Development Seminar, must be *completed* by the end of the third semester of study and is prerequisite to FE II, Ministerial Practice Seminar, taken during one of the last two semesters of study. One unit of clinical pastoral education may be substituted for FE I. Students must be enrolled in the school and have full-time status to be eligible for credited field seminars.

To qualify for credit the student must apply and be approved for a credited placement, develop and complete a learning covenant with acceptable quality of work, cooperate with the supervisor, participate in the assigned seminar, and prepare an evaluation of the experience. Evaluation and grading will be done by the field supervisor, student, and seminar leader.

Administering Ministerial Development

Development of ministerial competency is the responsibility of each student. If the Assistant Dean for Field Education questions a student's readiness for field assignment, a committee consisting of the student's faculty adviser, a member of the Field Education Committee, and the Assistant Dean will assess the student. Divinity School admission materials, evaluation by the Assistant Dean, and if necessary, additional professional evaluation will be used. This committee will approve field assignment, or refer the student to remedial avenues of personal and professional development, including, if necessary, a leave of absence or withdrawal from school. Such action will be referred to the Academic Standing Committee for inclusion in assessment of that student's progress towards graduation. When for whatever reason a student's evaluation from a field setting raises questions about the student's ministerial learning and/or growth, or that person's use of the setting for those purposes, the same committee will be convened to assess the student and the experience and to make appropriate recommendations to the Academic Standing Committee.

Field Settings for Ministry Development

Field placements are usually made in settings that have been developed and approved by the Divinity School. They offer opportunities for ministerial service with supervision, pastoral identity, and evaluation.

A wide variety of ministry settings is available for varying student interests: parish settings include rural, suburban, central urban, cluster groups, larger parish patterns, and staff team ministries; institutional settings include mental health institutions, prisons, youth rehabilitation centers, mental retardation centers, and retirement homes; campus ministry settings include positions on the campuses of a variety of schools as well as internships in college teaching.

While the Divinity School offers this rich diversity of settings for personal and ministerial development, the large majority of assignments fall in local churches in small communities. Because of the Divinity School's ties with the United Methodist Church, most field placements occur in that tradition. However, the Divinity School will do everything possible to see that each student completes at least one assignment in his or her own denominational tradition.

Internship Program

An internship assignment embraces both a full-time salaried position and a learning commitment in a single context over a period of time ranging from four to twelve months. These assignments are designed to engage the student in considerable depth in particular ministry skills in a setting relevant to the vocational area of interest. They must encompass an advanced level of specialized field experience which is more complex and extensive in its serving and learning potential than the basic field education short-term placement. The internship may be individually designed to meet the needs and interests of the student, provided that the plan includes a student learning covenant, an agency service contract, approved supervisory standards, an investigation-research project acceptable to the assigned faculty adviser, and participation in either a colleague group or seminar. When these components are satisfactorily met and the evaluation reports are filed, credit for up to two courses (six semester hours) may be assigned for the internship. No additional academic credit may be accumulated during the internship year. Grading for the two course credits will be on a pass/fail basis.

Internship settings may be student-initiated or negotiated by the school. In either case an agency contract covering all agreements must be made and filed with the Assistant Dean for Field Education. Types of settings occasionally available for internship placement include: campus ministry and college chaplaincy positions; parish



ministry positions—such as associate pastor, parish director of education; institutional positions; and a world mission internship of one to three years of national or overseas service. Other internships in the church or in specialized ministries in the secular world may be planned in consultation with the Assistant Dean.

To be eligible to register for an internship, the student must have completed at least one-half of his or her degree program and be registered as a student in good standing in the Divinity School. Application forms and processing for internships will be done through the Office of Field Education.

Students Serving As Pastors

Students frequently serve as pastors of churches, or part-time associates, during the period of their study in the Divinity School. These appointments are made by the appropriate denominational official or body. The Divinity School recognizes this arrangement and recommends that the student consult with the Assistant Dean for Field Education, as agent of the Dean, before accepting an appointment as pastor or associate pastor.

The field education office cannot make these appointments. This is within the jurisdiction of denominational authorities, and students should initiate their own arrangements. The field education office, however, will provide current information concerning pastoral appointments open to students and will send references upon request to ecclesiastical officials.

Students who serve in these capacities ordinarily may enroll in no more than three courses per semester, thus requiring, in most cases, eight semesters to complete the Master of Divinity degree. Relaxation of this regulation requires the permission (on the appropriate form) of the supervising church official, the Assistant Dean for Field Education, and the Associate Dean for Curricular Affairs. Students are strongly and actively discouraged from attempting to commute more than fifty miles one way on a daily basis. Extensive commuting tends to jeopardize the student's academic program, health, ministry, and family life.

In keeping with the goal of the school to develop professional competence in ministry, students should use their pastoral appointments as learning contexts for field education programs initiated by the school. Special seminars and reflection groups are arranged in consultation with students to advance their professional growth and performance. For particular field learning projects, a supervisor may be assigned to guide the pastor's learning activity in the parish. Periodic evaluation will be expected from both supervisors and pastors. The required field education units may be done in the pastor's parish, if all the conditions outlined for credit are met, and all reports are completed and filed at the appropriate time. If, however, the parish setting proves inadequate for the student's needs for ministerial growth and development, the Assistant Dean will convene a review committee consisting of the student's faculty advisor, a member of the Field Education Committee and himself to review the student's needs and take appropriate action to assist the student in growth. Examples of such action are: requiring an alternative field experience, or a basic unit of Clinical Pastoral Education, psychological evaluation, personal therapy, etc.

Field Education Seminars

The two field education units of credit required for the Master of Divinity degree may be earned by approved field placement and participation in the seminars listed below. FE I is prerequisite to FE II. Seminars must be concurrent with, or must immediately follow, involvement in the approved field setting.

FE I. Ministerial Development Seminar. Through the use of case material, critical reflection upon the nature and task of ministry as experienced in a field context

with special emphasis upon vocational development and ministerial role. Must be completed by end of third semester of study. Two hours a week. *Faculty or professional ministerial leadership.*

FE II. Ministerial Practice Seminar. Case studies to develop competence in church administration, preaching and worship, pastoral care and counseling, and religious nurture and teaching. Must be completed during the last two semesters of study. Two hours a week. *Faculty and staff leadership*

Registration for these seminars should be done through the Registrar's office at the normal registration time. Since no semester-hour credit values are assigned to these seminars, there will be no tuition charge for them. A quarter of clinical pastoral education completed in an approved setting may be substituted for both approved field placement and Field Education Seminar I but students who choose CPE for their Field Education II requirement will be required to take the FE II seminar.

Black Church Affairs



The Office of Black Church Affairs

The Office of Black Church Affairs has two principal objectives: (1) to assist black and other minority students in deriving the greatest possible value from theological education and (2) to call the entire Divinity School community—faculty, students, administrators, and staff—to serious and realistic dialogue with the surrounding black community. In keeping with these objectives, the Office of Black Church Affairs provides the following programs, activities, and services for black students and all others who elect to take advantage of them.

Academic Study. American theological education has long ignored the contributions of the black religious experience, a circumstance which the Divinity School curriculum addresses through (1) black-oriented course offerings in the core curriculum and (2) the integration of black material in the content of all other courses.

Preaching and Lecture Series. Fall and spring preaching and lecture series provide frequent opportunities to hear outstanding black preachers in the Divinity School classes and worship services. The Gardner C. Taylor Preaching Series is named in honor of an internationally recognized black pulpiter, the Reverend Doctor Gardner C. Taylor, pastor of Concord Baptist Church of Christ and brings outstanding black preachers to the campus.

The Martin Luther King, Jr. Lecture Series, initiated shortly after the assassination of the famed black civil rights leader, brings to the Divinity School community lecturers of national stature to address the issues of justice, peace, and liberation in relation to the insights of the gospel and the black religious experience.

Continuing Education. In cooperation with the Center for Continuing Education, the Office of Black Church Affairs provides several programs for black pastors in the region, including the Gardner C. Taylor Black Preaching Series, the Martin Luther King, Jr. Lecture Series, and seminars on black concerns and issues. Occasional conferences, colloquies, symposia, and the Annual Convocation and Pastors' School supplement these offerings.

Opportunities for academic study also abound for all qualified black pastors and lay persons. The extensive holdings of the Divinity School Library and the services of the Henry Harrison Jordan Loan Library are also available upon application to the librarian of the Divinity School.

Church Relationships. Through the Office of Black Church Affairs the Divinity School reaches out to the black churches in the Durham-Raleigh vicinity. Such relationships not only afford excellent field settings for ministerial study and work, they

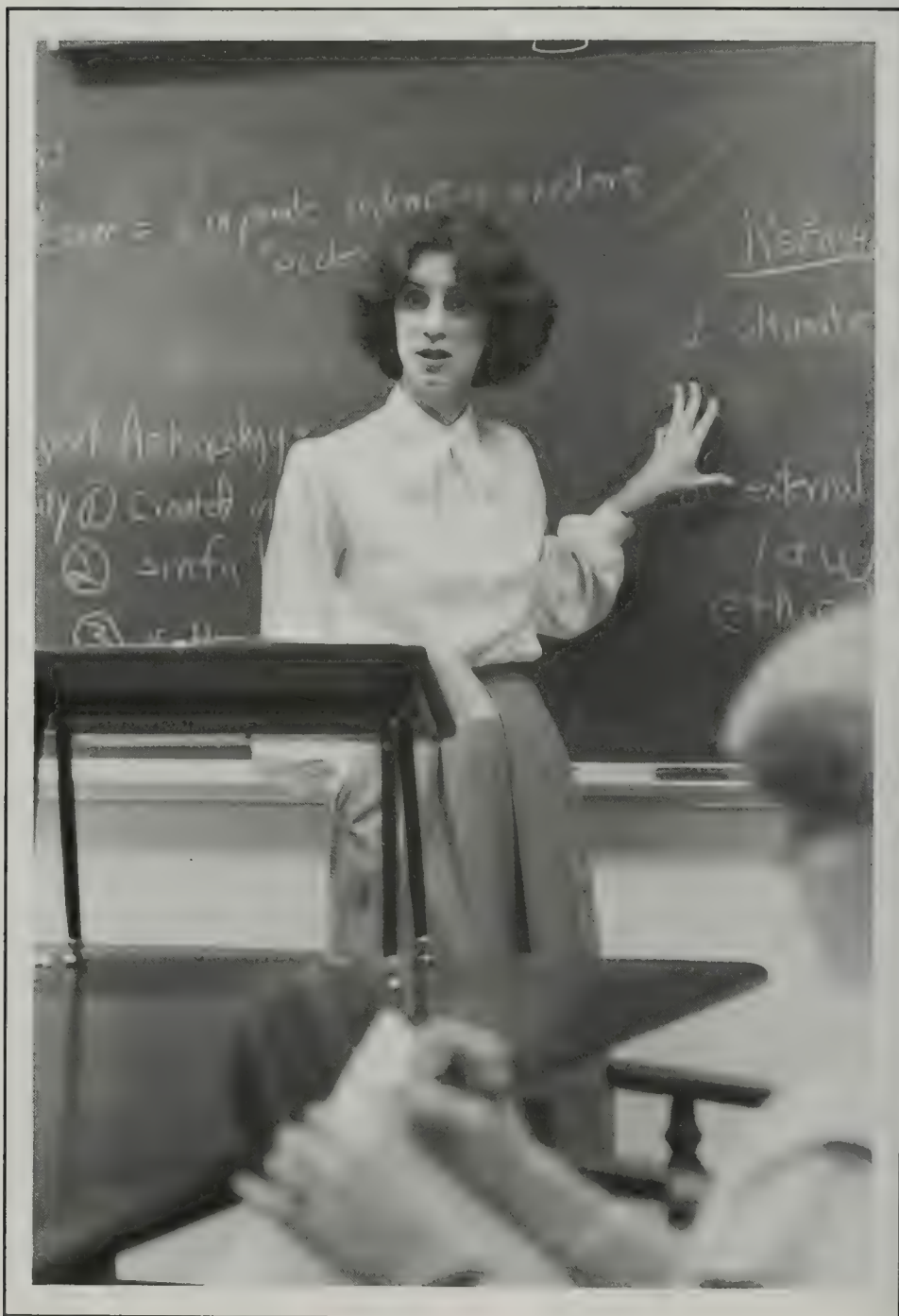


also provide a laboratory in which both blacks and whites together can gain wider knowledge *of*, deeper appreciation *for*, and increased sensitivity *to* the issues and urgencies of black culture.

The Office of Black Church Affairs also acts as a liaison with several clergy and community groups including the Interdenominational Ministerial Alliance and the Durham Ministerial Association.

The Office of Black Church Affairs provides counsel and advice to prospective black seminarians in undergraduate schools and encourages inquiries concerning study opportunities available at Duke Divinity School. For further information, contact Grant S. Shockley, Director of the Office of Black Church Affairs, Duke Divinity School, Durham, North Carolina 27706.

Continuing Education



The Center for Continuing Education

Through the Continuing Education Center the Divinity School offers extensive opportunities in education for ministry. The Charles P. Bowles Continuing Education Center in the new wing of the Divinity School includes seminar rooms and spacious study carrels for ministers involved in individual study or in-residence seminars. The Divinity School Library; the Henry Harrison Jordan Loan Library; the growing collection of tape recordings of sermons, lectures, and interviews; and the Pickens Communications Center are also available for continuing education for ministry. The Divinity School provides a year-round program of in-residence seminars and conferences, extension seminars and consultations, and special services to ministers and churches throughout the nation.

Admission and Scholarships

Conferences, churches, and other supporting groups and institutions have made available through the Divinity School certain designated funds to assist in continuing education for ministry. Inquiries, applications for admission, and requests for continuing education scholarships for in-residence seminars should be directed to: Director of Continuing Education, Duke Divinity School, Duke Station, Durham, North Carolina 27706 (919)684-3041.

In-Residence Seminars and Conferences

During the academic year 1984-85 the Divinity School conducted a series of continuing education seminars, workshops, and conferences for clergy. Some of these were: "The Language of Preaching"; "Theological Foundations for Ministry"; "Worship and Spirituality"; "Women in the Ministry"; "Science, Technology, and Religion". In addition, special seminars have been done for many districts for many districts from the Western North Carolina Conference and the North Carolina Conference. Current seminar schedules can be obtained through the Director of Continuing Education.

International Travel-Study Seminars

The Center for Continuing Education sponsored three international travel-study seminars in 1985. "An Introduction to Mexico" was led by Professor McMurray Richey; "The Challenge of Changing China" was led by Professor Creighton Lacy; and "Cities of the First Christians" (cosponsored with the Alumni Association) was led by

Professor Moody Smith. These seminars offer clergy international travel and excellent continuing education opportunities.

Duke Fellows Program

For some time now the Divinity School has had two programs for study leaves for ministers. The Benjamin N. Duke Fellows Program, funded by the Rural Church Office of the Duke Endowment, and the Parish Ministry Fund Fellows Program, funded by the Parish Ministry Fund of the Divinity School, gives ministers the opportunity for full-time, independent study for three months at the Divinity School. The Duke Fellows Program is comprised of these two fellows programs.

The Duke Fellows Program is open to any minister who has had five years of ministerial service. The Benjamin N. Duke Fellows Program is designed for pastors serving rural United Methodist churches (one located in an area with a population under 1,500). All candidates will submit a proposal describing how he or she will spend the study leave time. The Director of Continuing Education is ready to consult with candidates as to what a course of study might look like. The fellow is assigned a carrel and is expected to do independent study. Fellows are expected to be fully released from their pastoral responsibilities and to be in residence at the Divinity School.

Fellows will join a fellows' seminar which will meet weekly and give each fellow an opportunity to share what he or she is working on and to engage in conversation about mutual interests and concerns. The fellow will meet regularly with the Director of Continuing Education to give direction and aid to the study leave. In short, the Duke Fellows Program will give the fellow both independent study as well as community and support for that study.

The Director of Continuing Education, Joseph Mann, will also be glad to help you gain the support you need from your local church and assist you as you think about who will serve your parish while you are away. Duke fellows receive a stipend of \$5,000.

The Convocation and Pastors' School

The annual Divinity School Convocation and North Carolina Pastors' School, a cooperative endeavor with the North Carolina and Western North Carolina Conferences of the United Methodist Church through the Board of Managers of the Pastors' School, brings together ministers, lay persons, students, and faculty for a series of lectures, sermons, and courses, along with alumni reunions and social occasions. During the convocation the Gray and Hickman Lectures are given and continuing education seminars are offered.

The James A. Gray Lectures. These annual lectures, established in 1950 as part of a bequest made in 1947 by James A. Gray of Winston-Salem, North Carolina, are delivered in the context of the Divinity School Convocation and North Carolina Pastors' School. The 1984 Gray Lecturer was Morna Hooker from Cambridge, England.

The Franklin S. Hickman Lecture. This lectureship was established in 1966 as part of a bequest by Mrs. Franklin S. Hickman in memory of her late husband, Dr. Franklin Simpson Hickman, Professor of Psychology of Religion, Duke Divinity School, and Dean of the Chapel, Duke University. This lectureship enables the Divinity School to bring practicing ministers of extraordinary qualities to lecture and preach in the Convocation and Pastors' School and to participate in Divinity School classes, worship, and informal sessions with students and faculty. The 1984 Hickman lecturer was Fred Craddock of the Candler School of Theology, Emory University.

Seminars for Ministry. Nine Continuing Education Seminars were taught in 1984. These seminars included "Choosing Presidents in the Real World"; "Practical Guides

for Preaching"; "The Church and the Crises in Central America"; and "The Message and the Media."

Ministry in the Vicinity

Ministers and churches in the vicinity of Duke University are especially welcome to avail themselves of continuing education programs, facilities, and other services of the Divinity School and its faculty and students. They are invited to attend public lectures, visit with distinguished lecturers, participate in in-residence seminars and conferences, audit selected courses, study in the continuing education carrels, and use the resources of the Divinity School Library, the Henry Harrison Jordan Loan Library, and the tape recordings collection. Divinity School faculty, staff, and students are generally available for preaching, teaching, and other services in churches of the community and region.

The Henry Harrison Jordan Loan Library

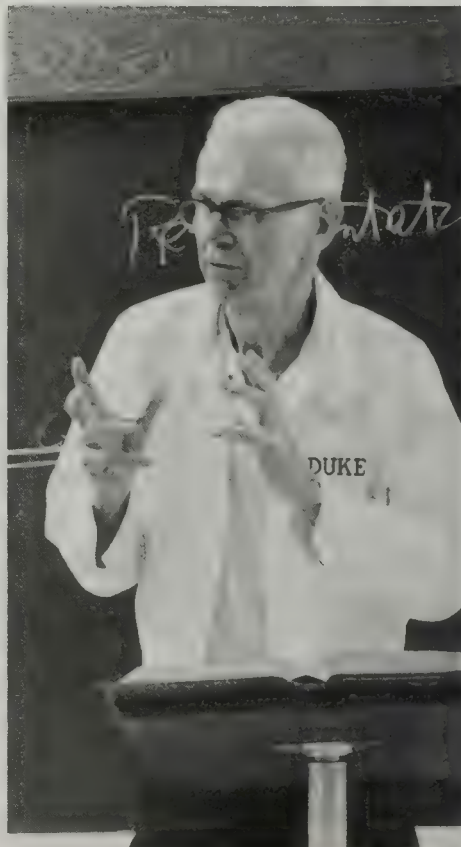
Henry Harrison Jordan, (1862-1931), distinguished member of the Western North Carolina Conference, was memorialized by his children by the establishment of an endowment in 1947. The Divinity School Librarian is the custodian of books purchased under this fund for loan, through postal services, to qualified ministers of all denominations or localities. The Jordan Loan Library undertakes to maintain a catalogue of up-to-date publications representative of the several theological disciplines and areas of the minister's professional interest. Books may be borrowed by application to the Librarian of the Divinity School.

Other Programs

Duke Summer Session. While the Divinity School does not presently offer a regular summer program, students may enroll for intensive biblical language courses (Greek in 1985, Hebrew in 1986) or individual directed study. Summer courses of graduate level may also be taken in other departments as cognate credits (maximum of two, see provisions under administration of the curriculum in the chapter "Curriculum."). Permission for such credits must be secured in advance from the instructor and from the Divinity School Registry, but official registration and payment of fees are handled in the Office of Summer Educational Programs, 120 Allen Building, Duke University, Durham, North Carolina 27706.

Facilities for Advanced Study through the American Schools of Oriental Research. Duke University is one of the supporting members of the American Schools of Oriental Research. Accordingly, students in the Divinity School have the privilege of attending the Albright Institute of Oriental Research in Jerusalem, the American Center of Oriental Research in Amman, and similar institutions without charge for tuition. They may also compete for the four fellowships offered annually by the schools, the stipends depending upon available funds.

The J. M. Ormond Center for Research, Planning, and Development. This center was established in memory of the late Dr. J. M. Ormond, Professor of Practical Theology of the Duke Divinity School and Director of the Rural Church Program under the Duke Endowment, 1923-48. The North Carolina Annual Conference established the J. M. Ormond Fund in 1951 as part of the special effort of the North Carolina and the Western North Carolina Conferences of the United Methodist Church to provide additional programs at the Divinity School. The center is directed by Dr. Robert L. Wilson, Professor of Church and Society. It is jointly supported by the Ormond Fund and the program of the rural church under the Duke Endowment.



The center has three purposes. First, it assists the Church in its ministry by providing research and planning services. Second, it provides training for ministerial students in church and community studies. Third, it contributes through basic research to the understanding of the nature and functioning of the Church. Emphasis is given to research and planning studies of rural United Methodist Churches in North Carolina.

Programs in Pastoral Psychology. Programs in pastoral psychology beyond the studies incorporated in the M.Div. curriculum are provided in cooperation with the Duke University Medical Center. Three such special programs are available.

1. The Master of Theology degree with a major in pastoral psychology is ordinarily a calendar year program beginning the first full week in June. However, upon the recommendation of the staff, candidates with a quarter or more of clinical pastoral education may begin their program in September. The candidate may plan one of three programs or concentrations: a concentration in pastoral theology relating psychology and theological understanding to professional ministry, especially the parish, through course work and supervised field or clinical experience; a concentration in pastoral care through course work and an intern year in basic clinical pastoral education; and a concentration in pastoral counseling through course work and a year of advanced clinical pastoral education. In the context of clinical pastoral education various professional goals may be sought including general understanding and skills in pastoral care and specialization in pastoral counseling and clinical supervision. The program in clinical pastoral education is certified by the Association for Clinical Pastoral Education. Persons specializing in pastoral counseling will advance toward certification with the American Association of Pastoral Counselors. A quarter of clinical pastoral education (PP 277A or its equivalent) is considered a prerequisite for all programs. Degree candidates who extend their program over the calendar year receive three certified units of clinical pastoral education and nondegree candidates receive four certified units.
2. Single quarters of Basic Clinical Pastoral Education are offered each summer (beginning the first Monday in June and running for eleven weeks) and during the academic year extended over two semesters. When the quarter is completed within one semester, the student may take two other courses in the regular M.Div. program; when it is extended over two semesters, the student may take three other courses. Two transfer course credits will be granted for a summer CPE quarter or two course credits will be granted for the quarter taken during the academic year (unless a course credit has already been granted for PP 177, in which case only one additional credit will be given for the CPE quarter).

Students in CPE may not have other field education appointment or employment. However a CPE quarter will, when satisfactorily completed, count as one field education unit if taken in relation to either Field Education Seminar I or II. Only one field education requirement may be fulfilled by CPE.

Students are reminded that ordinarily no more than five courses out of twenty-four for the M.Div. degree should be taken in any one subdivision.

3. A one-year certificate or nondegree internship program in clinical pastoral education is available through the Duke Medical Center for persons who hold the Master of Divinity degree or its equivalent. Also, students who wish to pursue a pregraduation intern year are invited to apply, provided they have completed at least one year of theological education. The certificate, nondegree intern year can be done at any level of clinical pastoral education (basic, advanced, supervisory) at which the candidate and the supervisory staff judge

appropriate. These persons may enroll in the Divinity School as special students for a course or two each semester. Such training usually provides four quarters of certified clinical pastoral education credit.

Admission to either the basic unit or the internship program of Clinical Pastoral Education is distinct from admission to the Divinity School. Applications for CPE enrollment are available in the Chaplain's Service Office, Duke Medical Center. The deadline for filing CPE applications is normally 15 January for the summer quarter and the intern year and 1 March for the extended quarter and the resident year.

For further information concerning any of these programs, write to Dr. Richard A. Goodling, Director, Programs in Pastoral Psychology, Duke Divinity School. See the section on the Master of Theology degree program.

Symposium on Christian Missions. Each year the Divinity School presents a symposium on the world mission of the Church, usually including a visit by a secretary or missionary personnel. The general aims are "to inform students and faculty of the philosophy and work of missions as seen through the personal experience of speakers; to educate present and future ministers so that they will have a vital concern for the promotion of missionary education in the local church; and to evaluate the missionary enterprise as a significant force in the revolutionary world."

The Course of Study School

In cooperation with the Division of Ordained Ministry of the Board of Higher Education and Ministry and the Southeastern Jurisdictional Conference of the United Methodist Church, the Divinity School hosts the Course of Study School for pastors of the United Methodist Church. This school is in session for four weeks each summer and the required studies for one full year can be completed in this period. This is not a part of the regular work of the Divinity School degree program, and no credit toward a seminary degree can be earned. The faculty includes representatives from the Divinity School and other church-related institutions. The thirty-sixth session of the Course of Study School is being held 25 June-20 July 1984.

Library Funds

The following funds provide resources to enrich the collections of the Divinity School Library.

Ormond Memorial Fund. Established in 1924 by Dr. J. M. Ormond, Trinity College Class of 1902, and Mrs. Ormond, in memory of his mother and father, Mr. and Mrs. J. J. Ormond, the income from the Ormond Memorial Fund is to be used for the purpose of a collection of books on the rural church for the Divinity School Library at Duke University.

Avera Bible Fund. Established in 1895 by gift of Mrs. L. B. McCullers in memory of her husband, Willis H. Avera; the income to be used for the purchase of books for the Divinity School Library and for the support of the Avera Bible Lectures.

Louis W. Bailey Memorial Fund. This memorial fund was established in 1958 by the Reverend A. Purnell Bailey in memory of his father. The income is to be used for books for the Divinity School Library.

Stuart C. Henry Collection Endowment Fund. This fund was established by the Class of 1975 in honor of Professor Henry with income to be used to purchase books in the collection on American Christianity.

The William Arthur Kale, Jr. Memorial Fund. William Arthur Kale, Jr. was a member of the Duke University Class of 1958, a lover of sacred art and music, and a member of the University Chapel Choir. In 1964 his parents, Professor and Mrs. Wil-

liam Arthur Kale, Sr., established a fund in his memory for the purchase of books and other materials in the area of fine arts and religious musicology for the perpetual enrichment of the holdings of the Divinity School Library.

The Walter McGowan and Minnie Daniel Upchurch Fund. Established in 1971 by W. M. Upchurch, Jr., an alumnus of Duke University and a member of its Board of Trustees, the fund, honoring Mr. Upchurch's mother and father, is used for the purchase of materials in the area of sacred music and is supplementary to a collection of materials given by Mr. Upchurch to the Divinity School Library. This collection includes 1,487 anthems and other compositions of sacred music, along with sixty-two disc recordings of the Duke University Summer Chapel Choir for the years 1937-41, at which time Mr. Upchurch was Director of the choir.

Curriculum



Degree Programs

The academic work of the Divinity School embraces three degree programs: the Master of Divinity degree (M.Div.) ordinarily of three academic years; a one-year program beyond the basic degree, the Master of Theology (Th.M.); and a third program of two academic years leading to the degree of Master of Religious Education (M.R.E.). All are graduate-professional degrees. Admission to candidacy for any of these three degrees presupposes the completion of the A.B. or its equivalent.

Students preparing for ordination to the Christian ministry and requiring appropriate graduate-professional education will enroll for the Master of Divinity degree. Students whose acquired academic standing, under this basic degree program, entitles them to further specialized study may advance their command of selected theological disciplines by applying for an additional year of studies leading to the Master of Theology degree. Together, these two degree programs constitute a sequence. Although the Master of Divinity degree fulfills requirements for ordination by prevailing ecclesiastical standards, the Th.M. program may assist in assuring a larger measure of professional preparation. Application for admission to the Th.M. program is open to graduates of other schools who have completed the basic theological degree.

The Master of Religious Education degree program is designed to prepare qualified persons, ordinarily not seeking ordination, for a ministry of Christian education in local churches or other organizations. The course of study is arranged to provide grounding in biblical, historical, and theological disciplines as essential background for instruction in and exercise of professional competence in curricular planning, teaching methods, and supervision of educational programs for various age groups.

The specific requirements for each of these degrees are found in the succeeding pages. It is evident that completed course work cannot be credited toward more than one degree. Reciprocal transfer of credit for course work taken under either the M.Div. or the M.R.E. program requires the permission of the Associate Dean for Curricular Affairs.

Doctoral Studies Accredited by the Graduate School

The Divinity School provides a substantial body of course offerings to an advanced level in biblical, historical, and systematic and contemporary theological disciplines that are accredited alike by the Graduate School and the faculty of the Divinity School, and lead to the Doctor of Philosophy degree. Sharing responsibility with the University Department of Religion for staffing and curricular provision of this course of study, the Divinity School is the principal contributor to the program of graduate

studies in religion. However, since the Ph.D. in religion is certified and awarded under the Graduate School, the doctoral student's admission and matriculation are administered under that division of Duke University.

With few exceptions, most courses in the *Bulletin of Duke University: The Divinity School* carrying a 200 number or above and belonging to the fields noted above are applicable to doctoral programs of study. These courses are open to qualified M.Div., Th.M., or M.R.E. students by permission of the instructor.

Qualified persons who desire to pursue studies leading to the degree of M.A. or Ph.D. in religion, under the administration of the Graduate School, are advised to apply to the Dean of that school. Inquiries concerning fellowships or specific requirements of the Program of Graduate Studies in Religion may be addressed to the Director, 209 Divinity School.

Administration of the Curriculum

Students are required at the time of each registration period to plan their course of study with the consultation and approval of their assigned faculty advisers. Such programs are subject to the review and approval of the Committee on Academic Standing, the Dean, and the Associate Dean for Curricular Affairs. It is the responsibility of each student to see that all requirements for graduation (and for ecclesiastical ordination) are met, and that any special permission granted to deviate from the normal program is properly recorded on the personal files in the registry.

Grading System. The Divinity School employs the grading scale with the following letters, *A, B, C, D, and F* which have been defined as follows: *A*, excellent; *B*, good; *C*, satisfactory; *D*, passing; *F*, failure; *WI*, withdrew illness; *W*, withdrew, discretion of the Dean; *I*, incomplete; *P*, passed; *NC*, noncredit; *Z*, year course. At the discretion of the instructor, individuals or classes may in certain instances be graded simply as pass or fail. Such *P/F* grades shall be limited to no more than 25 percent of a student's total curriculum at Duke and will not be figured in the grade point average.

The denotations are defined as follows according to quality points: *A*, 4; *A-*, 3.7; *B+*, 3.3; *B*, 3.0; *B-*, 2.7; *C+*, 2.3; *C*, 2.0; *C-*, 1.7.

Limited Program. Students whose work after admission is not satisfactory may be placed on limited programs by the Academic Standing Committee and required to reduce their course loads or to make other academic adjustments. Students who during the first year of Divinity School maintain less than a *C* (2.0) average, including failures, ordinarily will be required to withdraw from the school.

Incompletes. A student may petition the Associate Dean for Curricular Affairs to receive a grade of incomplete in a course. This petition must be filed in writing on the prescribed form with the registry on or before the last official day of classes of the semester in question. Such permission may be granted when a student, through some circumstances beyond control, such as illness, has been hindered from meeting the course requirements. Adjudication of the petition will rest with the Associate Dean and the instructor concerned. The Associate Dean will communicate in writing to the student regarding the joint decision and any conditions attached thereto. An incomplete becomes an *F* unless it is removed through completion of assigned work by the following dates: for incompletes incurred in fall semester courses, 1 February; for incompletes incurred in spring semester courses, 15 September.

Change of Courses or Withdrawal. Students are permitted to change their course registrations, without incurring a penalty, during the prescribed drop/add period at the beginning of each semester. Any alteration in the number of courses must be officially reported and recorded. The adding of a course requires the permission of the instructor of that course as well as the student's faculty adviser. Any refund of tuition related to withdrawals will be according to the published schedule.

No student will be permitted to withdraw from a course after one-half of the semester without incurring failure, except for causes adjudged by the Associate Dean for Curricular Affairs to be beyond the student's control. Conditions of genuine emergency and not considerations of convenience will be determinative in considering requests, which must be submitted in writing on academic petition forms.

Leave of Absence. A student wishing to take a leave of absence for one or two semesters, and intending to return to a degree program in the Divinity School, should so notify the Associate Dean for Curricular Affairs in writing in advance. No leave of absence will be granted for more than one full academic year, although an emergency extension may be requested from the Associate Dean.

Withdrawals from School. Students deciding to withdraw from the Divinity School, for whatever reason, should consult with their faculty advisers and the Associate Dean for Curricular Affairs, and must file a written statement of withdrawal prior to departure. All students who have officially withdrawn or whose leave of absence extends beyond one academic year but who wish later to return to the Divinity School will be required to reapply for admission, and provide whatever documentation is required by the Director of Admissions.

Directed Study. Students may, with permission of their faculty advisers and the instructors involved, take one or two units of Directed Study, preferably not in the same semester. These independent study courses under individual faculty supervision are ordinarily in subjects at an advanced level which cover material not available in the regular curriculum. Students wishing to take more than two courses by Directed Study must have permission from the Associate Dean for Curricular Affairs in consultation with the student's faculty adviser and the instructor who agrees to direct that study.

Cognate Courses. Students may, in consultation with their faculty advisers, take up to two graduate level courses in other departments of Duke University or at the University of North Carolina. Permission for more than two such cognate courses must be secured from the Associate Dean for Curricular Affairs, but courses in the Duke Department of Religion do not count within this limit.

Graduation with Distinction. Students who achieve a grade point average of 3.85 for overall academic records in the M.Div. and M.R.E. programs are granted the degree *summa cum laude*. Students with a grade point average of 3.65 or above are awarded their degrees, *magna cum laude*. Such distinction is calculated on the basis of letter grades only, totaling at least three-quarters of all courses taken at Duke, and will be indicated on the student's diploma.

Part-Time Students. Students taking less than three courses in any given semester are considered part-time students and are ineligible for financial aid from the school.

Auditors. Full-time students paying for at least three courses are permitted to audit additional courses, if space permits, with the approval of their advisers, the Associate Dean for Curricular Affairs, and the instructor of the class. Special students, part-time students, or persons not candidates for degrees in the University are charged an audit fee for each such course.

The Basic Theological Degree—Master of Divinity

The faculty of the Divinity School constantly endeavors to review the curriculum as a whole and to tailor individual courses to meet the needs of a rapidly changing world. Major curricular revisions were instituted in 1948, 1959, and 1967. The curric-

ulum is, therefore, not static but dynamic and is always subject to emendation by the faculty.

This degree program is structured to elicit a positive response to: (1) the challenge to provide an adequate professional education—education for ministry; (2) the needed variability of ministries in today's complex world; (3) the norms of university education; and (4) the Christian tradition.

Aims of the Curriculum. The aims of the basic degree program focus upon four goals, four areas of personal and curricular responsibility, four lifelong tasks which should be strongly advanced during the seminary years.

1. *The Christian Tradition.* To acquire a basic understanding of the biblical, historical, and theological heritage.
2. *Self-Understanding.* To progress in personal and professional maturity—personal identity, life-style as an instrument of ministry, major drives, handling of conflict, resources, and professional competency and so forth. This is to be coupled with a sensitivity to the world in which we minister—its social forces, its power structures, its potential for humanization and dehumanization.
3. *Thinking Theologically.* To have the ability to reflect about major theological and social issues and to define current issues in theological terms and theological issues in contemporary secular terms.
4. *Ministering-in-Context.* To have the ability to conceptualize and participate effectively in some form of contemporary ministry.

Goals of such scope cannot be neatly programmed in any curriculum, and the degree of achievement (in seminary and beyond) will vary with individuals and their own motives and incentives.

The Basic Curriculum—General Description. Graduation requirements for the Master of Divinity degree consist of satisfactory completion of twenty-four courses, including the eight basic courses or their equivalent, with an overall grade point average of C (2.0) or better, plus satisfactory completion of two units of approved field education with appropriate seminars.

The basic curriculum provides for foundational courses in biblical, historical, theological, and ministerial studies, representative of the tradition and regarded as indispensable background for subsequent elective work and individual program information. These required courses total eight of the twenty-four courses necessary for graduation. They are Old Testament 11, New Testament 18, Church History 13 and 14, American Christianity 28, Christian Theology 32, Christian Ethics 33, and Black Church Studies 124. The opportunity of advanced standing adds further variability to the academic program, depending upon the nature and quality of the student's undergraduate academic work. Sixteen courses, two-thirds of the required total, are available for working out an individualized program of studies leading to specialized preparation in academic depth and for purposes of professional ministerial competence.

Required courses may be staffed by one or more professors and are planned to treat subject matter both in scope and depth at the graduate level.

The formulation of the student's course of studies is guided by certain broad but normative recommendations for area distribution of courses and by the advice and counsel of appointed faculty advisers or authorized directors.

Students and advisers are directed to read diligently the paragraphs on elective studies and professional aims and distribution of elective studies in the section on administration of the curriculum.

All academic programs are subject to review and emendation by the Dean and the Associate Dean for Curricular Affairs for the fulfillment of the aims of the curriculum. The declared vocational and professional objective of the student is of central

importance both to the student and to the faculty adviser in planning the student's comprehensive study program.

Six semesters of residential study are ordinarily required for the completion of the degree. With permission of the Associate Dean for Curricular Affairs, certified nonresidential study, not exceeding the equivalent of eight courses, may be permitted to a candidate for the basic degree.

The normal academic load is four courses per semester. A student with demonstrated competence may, with the consent of the academic adviser and the Associate Dean for Curricular Affairs, enroll for an additional course in the middler and senior years.

General Features of the Basic Curriculum. The following is a brief summary of the basic curriculum.

1. Twenty-four courses and six or more semesters of residency are required for graduation.
2. Each student is required to complete two approved assignments in field education (with or without remuneration) under supervision. Such assignments might include an internship, a summer of full-time work, two semesters of part-time work, or involvement in church or community service. The essential criteria for graduation credits are that the amount and quality of supervision be approved by the Office of Field Education, and that the student be required to evaluate and correlate the experience directly.
3. A normal academic load is four courses with credit.

Admission to candidacy for the Master of Divinity degree is admission to the regular program of studies. The suggested paradigm defines the normal sequence of the student's developing program. Students enrolled for less than three courses are considered part-time and are not eligible for financial aid or student health services.

The curriculum intends to serve graduate-professional aims with maximum flexibility. Sixteen elective courses are available and may be programmed to satisfy vocational and professional preferences. In planning a course of study, the student, in consultation with the adviser, should choose a program which will give a broad understanding and appreciation of future professional responsibilities. Members of the faculty and staff welcome inquiries.

Professional ministries include those of the parish, preaching, teaching, and pastoral care; ministries of education in local churches and higher education; missions; campus ministry; specialized urban and rural ministries; chaplaincies—hospital, institutional, industrial, and military; teaching; religious journalism; audiovisual communications; church agencies; and ecumenical ministries at home and abroad. For many of these, further specialized training will necessarily be sought elsewhere beyond the basic degree. For all of these ministries the student's program of studies can be shaped for the particular ministry in view.

Students are encouraged to elect at least one course in each of the following areas or subdivisions of the curriculum beyond the required courses: American Christianity; history of religion; Christian education; world Christianity and ecumenics; biblical exegesis; pastoral psychology; Christian ethics; worship and preaching; care of the parish (including church and community). Such advanced courses should be selected with a view to the individual's vocational and professional aims and in consultation with the student's faculty adviser. Students are also encouraged to concentrate, usually in not more than five courses in any one subdivision of the curriculum, in an area directly related to their vocational and professional intention. The program of each student is subject to review and revision by action of the faculty adviser, the Committee on Academic Standing, the Associate Dean for Curricular Affairs, or the Dean.

A SUGGESTED CURRICULAR PARADIGM

Junior Year

Fall Semester

Old Testament 11
Church History 13
Elective
Elective

Spring Semester

New Testament 18
Church History 14
Elective
Elective

Middler Year

Fall Semester

Systematic Theology 32
American Christianity 28
Elective
Elective
Field Education Seminar I

Spring Semester

Christian Ethics 33
Black Church Studies 124
Elective
Elective

Senior Year

Fall Semester

Four elective courses
Field Education Seminar II

Spring Semester

Four elective courses

Student Pastors. Students in candidacy for the Master of Divinity degree who serve as full-time pastors or work more than fifteen hours per week in addition to their academic schedule are advised that their degree programs will usually require a fourth academic year. Modification of this schedule requires the approval of the Associate Dean for Curricular Affairs on recommendation of the Assistant Dean for Field Education.

1. Students with pastoral charges or comparable extracurricular responsibilities ordinarily will enroll for not more than three courses.
2. Students who accept pastoral charges in their middler or senior year are required to have the prior approval of the Assistant Dean for Field Education. Such students will be required to restrict their course work in accordance with regulation 1 above.
3. Modifications of these regulations will be scrupulously administered. Academic achievement, normally a *B* average, must be demonstrated before any modification of these requirements is allowed. Since adequate indication of the student's academic proficiency is not available before the completion of the first academic year, no modification of regulation 1 is possible for junior students.
4. Students who secure minor employment outside the channels of the Office of Field Education are required to inform the Assistant Dean for Field Education. Students carrying an outside employment work load of more than fifteen hours per week will be required to limit their academic load.
5. Ordinarily a student may not commute more than fifty miles (one way). Students living farther away than this will be required to stay in Durham during the academic week.
6. Student assistant pastors (not pastors-in-charge) may enroll for a full academic load if they are not on limited program, if their work is under the supervision of the Assistant Dean for Field Education, and if their field duties involve no more than fifteen hours per week.



Study Abroad. Study abroad, with transferable credit toward graduation, may be allowed for a candidate for the Master of Divinity degree by approval of the Associate Dean for Curricular Affairs. A strong academic record is a prerequisite. Ordinarily, permission for such study may be granted to students who have completed the work of the middler year. Both the institution abroad and a specific course of study proposed must have the prior approval of the Associate Dean for Curricular Affairs. Required courses and the two field education units must usually be completed at Duke.

Transfer Credits. Transfer of credit to the Divinity School of Duke University, leading to candidacy for the degree of Master of Divinity, will normally be limited to one-third of the academic credits (in proportional evaluation) required for fulfillment of degree candidacy (see the chapter, "Admissions").

Advanced Placement. Students may, on the basis of undergraduate courses, a religion major, or other substantial preparation, be given advanced placement in one or more of the eight required subjects. Such placement normally presumes at least two college courses in a given area (e.g., Old Testament) with a satisfactory grade average.

Students who do not receive advanced placement at matriculation but who believe that they can qualify for upper level work without the introductory course may apply to the Associate Dean for Curricular Affairs. The faculty in the appropriate division (biblical, historical, or theological) will set procedures for determining basic competence in the particular field, ordinarily by an examination and assigned paper. A student may apply for such testing only once in a single area, not later than the beginning of the fourth semester.

Ordination Requirements. Students preparing for ordination are strongly advised to ascertain early in their seminary program the precise ordination requirements of their denomination.

United Methodist students must fulfill educational requirements in the *Discipline*, by completing the year-long course on Methodist doctrine, history, and polity (CP 159 and 160). Most annual conferences also require one or more courses in preaching and worship and/or clinical pastoral education.

Students from other denominations should consult with their appropriate church bodies for specific requirements, which may include biblical languages. Polity courses for certain other denominations may be offered from time to time by faculty members or local clergy on prior request.

Continuation Requirements. The following are the continuation requirements for students enrolled in the M.Div. degree program:

1. The student must maintain a cumulative grade point average of 2.0. If a student falls below this level he or she may be terminated or warned and placed on limited program. This means that the student may enroll in no more than three courses.
2. At the end of the second semester the student on limited program who does not attain a cumulative GPA of 2.0 is terminated. In exceptional cases a student who shows substantial improvement the second semester but does not quite attain a GPA of 2.0 may be given a third semester to do so.
3. The progress of all students is reviewed at the end of every semester by the Academic Standing Committee.

The M.Div degree must be completed within six years (twelve semesters). The minimum time in which a degree can be completed is three years (six semesters).

To be classified as full time, a student must be enrolled in three or more courses in a semester.

The Master of Religious Education Degree

The course of study leading to this degree is designed for persons desiring to prepare for leadership and service in the educational ministry of the church.

Admission. Applications for admission to the Master of Religious Education program are evaluated by the same standards as those applicable to the Master of Divinity degree, and admission requirements and procedures are also the same. Students planning to specialize in Christian education should study the sections of this bulletin which contain statements of policy regarding the most appropriate prerequisite studies for theological education and the procedures to be followed in applying for admission.

Requirements. The Master of Religious Education degree usually requires two years, or four semesters, of residence and study and the fulfillment of the following requirements:

1. Sixteen courses, twelve of them limited electives and four free electives, selected by the candidate in consultation with the academic adviser.
2. One unit of supervised field education.
3. An overall grade point average of C (2.0) or better in those courses receiving letter grades.
4. A final comprehensive examination.

Program of Study for M.R.E. Degree

Limited electives	12
Four courses in Christian Education	
Two courses in the Biblical Division	
Two courses in the Historical Division	
Two courses in the Theological Division	
Two courses in the Ministerial Division (other than Christian Education)	
Free electives (which may include one cognate course in another department of the University)	<u>4</u>
	16
Final Comprehensive Examination	

Continuation Requirements. The following are the continuation requirements for the MRE degree program:

1. The student must maintain a cumulative grade point average of 2.0. If a student falls below that he or she may be given a second semester to bring the cumulative GPA up to 2.0. Failure to do so results in termination.
2. The progress of all students is reviewed at the end of every semester by the Academic Standing Committee.

The minimum time in which the MRA can be completed is two years (four semesters). The degree must be completed in four years (eight semesters). To be classified as full time a student must be enrolled in three or more courses.

The Master of Theology Degree

The course of study leading to the degree of Master of Theology is designed for graduates of accredited theological schools who desire to continue or resume their theological education for enhancement of professional competence in selected areas of study. Enrollment in the Th.M. degree program is open to a limited number of students who have received the M.Div. (or the equivalent) with superior academic records.

Inquiries on admission may be addressed to the Director of Admission for referral to the Director of the Th.M. Program.

General Requirements. The general requirements for the degree of Master of Theology are:

1. Eight course units of advanced studies, with an average grade of *B* (3.0 average on a 4.0 scale).
2. Superior performance in a comprehensive examination covering the major area of study. As an alternative to the comprehensive examination the student may elect to do a research project in one major area if approved by the supervising professor. This project shall carry one course credit, to be counted within the eight units required.
3. Residence for one academic year or the equivalent. (Equivalency to be determined by the Associate Dean for Curricular Affairs).

There are no general language requirements. However, classical or modern languages may be required for certain programs (for example, in biblical studies, Hebrew or Greek may be required).

The Program of Study. At least four of the required eight courses must be taken in one of the basic divisions of study (biblical, historical, theological, or ministerial) which shall be designated as the candidate's major, and at least two courses in another of the divisions which shall be designated as the candidate's minor. Ordinarily, no more than two units may be taken through directed reading, and no more than one of these in any one semester. In the area of pastoral psychology, up to four course units may be taken through clinical pastoral education.

The comprehensive examination will be given at the close of the course of study for the degree, ordinarily in May or September.

The entire program of studies and comprehensive examination should be completed within twelve months. In some cases, the time limit may be extended, but in no case beyond three years.

The candidate majoring in pastoral psychology may plan one of three programs or concentrations: a concentration in pastoral theology relating psychology and theological understanding to professional ministry, especially the parish, through course work and supervised clinical experience; a concentration in pastoral care through course work and an intern year in basic clinical pastoral education; a concentration in pastoral counseling through course work and a year of advanced clinical pastoral education. In the context of clinical pastoral education various professional goals may be sought, including general understanding and skills in pastoral care and specialization in pastoral counseling and clinical supervision. The Clinical Pastoral Education Program is certified by the Association for Clinical Pastoral Education. Persons specializing in pastoral counseling will be moved toward certification with the American Association of Pastoral Counselors. Course PP 277A (or its equivalent) is considered a prerequisite for a major in pastoral psychology, but is not applicable toward the eight courses required for the degree, although it will be indicated on the student's transcript. Accordingly, the student majoring in this area should ordinarily make provision for a program extending for a full calendar year beginning the first week in June.

Financial Aid. Please note in the pertinent sections of the chapter "Financial Information" that the charges for tuition and general fee for the Th.M. degree are combined and are made on the basis of the number of courses taken, and that in order to be eligible for medical care a student must be taking at least three courses.

Continuation Requirements. The following are the continuation requirements for the Th.M. degree program.

1. The student must maintain a cumulative grade point average of 3.0. A student who falls below this level is terminated.
2. The progress of all students is reviewed at the end of every semester by the Academic Standing Committee.

The Th.M. degree must be completed within three years (six semesters). The minimum time in which the degree can be completed is one year (two semesters).

To be classified as full time a student must be enrolled in three or more courses in a semester.

Special Programs

Duke Divinity School is a participant in the National Capital Semester for Seminary students conducted by Wesley Theological Seminary in Washington, D.C. Students may, with the approval of the Associate Dean for Curricular Affairs, enroll in this one-semester program focused on political issues and social ethics, and receive up to four transfer credits. Applicants must have completed at least two and not more than four semesters at Duke to be eligible.

International Study Programs

For several years the Divinity School has been developing programs of international study and exchange involving faculty and students. The main areas in which the development is centered at this time are the following:

Mexico Seminar. Brief intensive travel-study to foster appreciation of Mexico, its people, history, culture, and religion—with special attention to the faith and mission of the church in Latin America today. Direct encounter with Third World poverty. About twelve persons per seminar. Twice annually.

China Seminar. A travel-study seminar on the re-emergence of the Church in China focusing on the unprecedented response to the Church in a Marxist society. Participants have the opportunity also to learn about China and its people and see firsthand the changes taking place in this remarkable country. Biannually.

Robert E. Cushman Exchange Fellowship. Each year faculty and staff nominate a student to represent the Divinity School in the Bonn/Duke Exchange program. At Bonn University (West Germany) the student for a year becomes thoroughly acquainted with another culture and different church life. Full participation in classes at Bonn required. Language preparation necessary.

Dumfries, Scotland. In cooperation with St. Michael's Parish, Dumfries, Scotland, the Divinity School offers an academic year's experience. A modest stipend provides basic support and trans-Atlantic air fare. This opportunity is open each year to one rising senior who serves as a full-time parish assistant for this parish of the Church of Scotland.

Courses of Instruction



Course Enrollment

The required courses of the curriculum are: Old Testament 11, New Testament 18, Church History 13 and 14, American Christianity 28, Christian Theology 32, Christian Ethics 33, and Black Church Studies 124. Other courses numbered through 199 are elective courses for Divinity School students only. Most courses numbered 200 and above are approved for credit by both the Divinity School and the Graduate School, and require the permission of the instructor. For other prerequisites the student should consult the roster of courses of instruction in this bulletin and should also refer to published registration advices at the time of registration for each semester.

Courses jointly approved by the Divinity School and the Graduate School of Duke University are published in the *Bulletin of Duke University: The Divinity School*. Courses offered in the Department of Religion of Duke University, or as cognate courses in other departments, must be of graduate level (numbered 200 or above) in order to fulfill requirements for degrees in the Divinity School.

Projected Course Offerings

The following list of proposed course offerings for the 1985–86 academic year is tentative and subject to change. Detailed listings are available at the time of preregistration in the middle of the preceding semester, and more distant plans may be ascertained by consulting the divisional representative or the instructors concerned.

Fall Semester 1985

Old Testament (OT) 11, 101, 115
New Testament (NT) 103, 114, 116E, 118, 225, 226A
Church History (CH) 13
Historical Theology (HT) 118, 139, 246, 337
American Christianity (AC) 28, 199
Christian Theology (CT) 32, 112, 146, 229, 256, 330
Christian Ethics (CHE) 112, 213, 215, 242, 262, 291, 387
Black Church Studies (BCS) 126
World Christianity (WC) 156
Care of the Parish (CP) 128, 147, 150, 152
Christian Education (CED) 105, 108, 120, 231
Church Worship (CW) 141, 178
Pastoral Psychology (PP) 70, 164, 170, 172, 177, 271, 276A, 278, 281A
Preaching (PR) 30, 196

Spring Semester 1986

Old Testament (OT) 106E, 116, 130, 223, 237
New Testament (NT) 18, 104, 105, 117C, 180, 226B, 341
Church History (CH) 14, 105
Historical Theology (HT) 318, 338
American Christianity (AC)
Christian Theology (CT) 108, 110, 119, 220, 249, 272
Christian Ethics (CHE) 33, 130, 136, 213, 215, 244, 389
Black Church Studies (BCS) 100, 124, 128, 144
World Christianity (WC)
Care of the Parish (CP) 129, 130, 160
Christian Education (CED) 100, 132, 175, 169, 233
Christian Worship (CW) 250
Pastoral Psychology (PP) 170, 174, 175, 178, 273, 275, 276B, 281B
Preaching (PR) 30, 162, 180

I. Biblical Studies

OLD TESTAMENT

11. Introduction to Old Testament Interpretation. An introduction to the literature, history, and religion of ancient Israel with emphasis upon exegetical methodology. *Bailey and Murphy*

101. The Prophetic Movement. A study of the prophetic movement in Israel from the earliest period to the postexilic development of apocalyptic with special reference to the content and religious teaching of the prophetic writings. *Efird*

106. Exegesis of the English Old Testament. Prerequisite: OT 11 or equivalent.

106A. Genesis. *Bailey*

106B. Amos and Hosea. *Bailey*

106D. Wisdom Literature in the Old Testament. *Murphy*

106E. Old Testament Psalms. Exegesis of various literary types; theological orientation of Old Testament liturgical prayer; implications for prayer and liturgy today. *Murphy*

109. The Religion of the Old Testament. A study of the religious ideas contained in the Old Testament with special reference to their interpretation from Robertson Smith to the present. *Efird*

115–116. Introduction to Biblical Hebrew. Elements of phonology, morphology, and syntax. Exercises in reading and writing Hebrew. Exegetical treatment of the book of Jonah. (Two semesters: no credit will be given for 115 without completion of 116.) *Bailey*

130. Dying and Death. Critical consideration of biblical, legal, medical, and ethical perspectives. Prerequisites: OT 11, NT 18, or equivalents. *Bailey, H. Smith, and others*

180. From Text to Sermon. (See PR 180.) *Staff*

207. Intermediate Biblical Hebrew I. Historical Hebrew grammar with reading and exegesis of Old Testament prose (Pentateuch and historical books in alternate years). *Wintermute*

208. Intermediate Biblical Hebrew II. Historical Hebrew grammar and rapid reading of prose and poetry. *Meyers*

209. Old Testament Theology. Studies of the Old Testament in regard to theological themes and content. Prerequisite: OT 11 or equivalent. *Murphy*

220. Rabbinic Hebrew. An interpretive study of late Hebrew, with reading from the Mishnah. *Staff*

223. Exegesis of the Hebrew Old Testament. Prerequisite: OT 115–116.

223A. Amos and Hosea. Stress on hermeneutical method. *Bailey*

223B. Job. *Murphy*

223C. I Samuel. *Bailey*

223D. Song of Songs. *Murphy*

223E. Ecclesiastes. *Murphy*

237. History of the Ancient Near East. Emphasis upon the religions, literature, and art of Mesopotamia. *Bailey*

242. Life after Death in Semitic Thought. Consideration of the various ideas from the early second millennium through the Intertestamental Period. Exegesis of selected Old Testament passages. Evaluation of recent research. Prerequisite: OT 11 or equivalent, knowledge of Hebrew helpful but not required. *Bailey*

302. Studies in the Intertestamental Literature. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to postexilic Judaism. *Staff*

304. Aramaic. A study of the Aramaic portions of the Old Testament and selected passages from the Elephantine and Qumran texts. *Wintermute*

350, 351. Seminar in Old Testament. Research and discussion on selected problems in the Old Testament and related fields. *Murphy*

353. Seminar on Text Criticism. Emphasis upon transmission, versions, apparatus, and method. Prerequisites: NT 103–104 and OT 115–116 or equivalents. *Bailey and others*

373–374. Elementary Akkadian. Study of the elements of Akkadian grammar. Reading of neo-Assyrian texts shedding light on the Old Testament. Prerequisite: biblical Hebrew. (Two semesters: not credited separately.) *Bailey*

375–376. Elementary Ugaritic. Study of the elements of Ugaritic. Prerequisite: biblical Hebrew. (Two semesters: not credited separately.) *Staff*

NEW TESTAMENT

18. Introduction to New Testament Interpretation. An introduction to the literature of the New Testament with special attention to the perspectives and methods of historical-critical investigation and interpretation. *Efird or M. Smith*

103–104. Hellenistic Greek. Designed for beginners to enable them to read the Greek New Testament. (Two semesters: no credit will be given for 103 without completion of 104; however, students with at least one full year of college Greek may be permitted to enroll in 104.) *Efird*

105. Studies in Paul. An investigation of Paul's apostolate based upon the Acts and the Epistles with attention to Paul's theology as reflected in selected passages. *Efird*

114. Jesus in the Gospels. A consideration of the origins, transmissions, and literary fixation of the Jesus traditions with special attention to the message of the Kingdom, the problem of messianic self-consciousness, and the passion. *M. Smith*

116. Exegesis of the English New Testament I. *Staff*

116A. Luke-Acts

116B. Galatians

116C. Selected Later Epistles

116D. I and II Corinthians

117. Exegesis of the English New Testament II. *Staff*

117A. The Gospel and Epistles of John

117B. Romans

117C. Revelation

117D. Mark

118. The New Testament in Greek. Readings in the Gospels. *Staff*

119. The New Testament in Greek. Readings in the Epistles. *Staff*

180. From Text to Sermon. (See PR 180.) *Staff*

225. Living Issues in New Testament Theology. Critical examination of major problems and issues in New Testament interpretation and theology. Prerequisite: NT 18 or equivalent. *M. Smith*

226. Exegesis of the Greek New Testament I. Prerequisite: NT 103–104. *Price or M. Smith*

226A. Mark and Matthew

226B. Romans

226D. I and II Corinthians

226E. The Gospel and Epistles of John

227. Exegesis of the Greek New Testament II. Prerequisite: NT 103–104. *Price or M. Smith*

227A. Luke-Acts

227B. Galatians

227C. The Pastoral Epistles

309. Hermeneutics. Consideration of the nature of understanding and of several interpretive methods including phenomenological, existential, historical, literary, and structural. Their application to New Testament texts, primarily the parables of Jesus. *Via*

311. Pharisaic Judaism in the First Century. A reading course in first-century Pharisaic Judaism. *Staff*

312. Pauline Theology. Studies in some aspects of Paulinism in the light of recent scholarship. *Staff*

314. Judaism and Christianity in the New Testament. A study of their interaction with special attention to Paul. *Staff*

319. The Gospel According to St. Matthew in Recent Research. *Staff*

340, 341. Seminar in the New Testament. Research and discussion on a selected problem in the biblical field. *Price and M. Smith*

345. The Epistle to the Hebrews in Recent Research. *Staff*

II. Historical Studies

CHURCH HISTORY

13. History of the Church to the Protestant Reformation. A survey through the fifteenth century in terms of spiritual genius, organizational development, great literature, and representative movements. *Gregg*

14. History of Modern European Christianity. A survey of the main currents in Reformation and post-Reformation church history. *Steinmetz*

105. Studies in Patristic Christianity. Selected issues in the worship, theology, and politics of the early Church. *Gregg*

126. The English Reformation. The religious history of England from the accession of Henry VIII to the death of Elizabeth I. Extensive readings in the English reformers from Tyndale to Hooker. *Steinmetz*

140. The Rise of Methodism and the Anglican Background. The Methodist societies within the Church of England to the death of Wesley. Prerequisite: CH 13–14. *Staff*

201. Schism and Heresy in Early Christianity. Studies of crises precipitated by movements such as Gnosticism, Donatism, Arianism, and Pelagianism. *Gregg*

202. Religion of the Cappadocian Fathers. Examination of the careers and writings of Basil, Gregory of Nyssa, and Gregory of Nazianzus. *Gregg*

206. Christian Mysticism in the Middle Ages. Source studies in historical perspective of such late medieval mystics as Bernard of Clairvaux, the Victorines, Ramon Lull, Meister Eckhart, Richard Rolle, Catherine of Siena, and Nicholas of Cusa. Prerequisite: CH 13. *Steinmetz*

236. Luther and the Reformation in Germany. The theology of Martin Luther in the context of competing visions of reform. *Steinmetz*

247–A, B. Readings in Latin Theological Literature. Critical translation and study of important theological texts in Latin from various periods of the history of the Church. Prerequisite: reading knowledge of Latin (introductory course offered in the classics department). *Staff*

334. Theology and Reform in the Later Middle Ages. Examination of selected issues in the life and thought of the medieval church from the twelfth century through the fifteenth century. Readings in popular and academic theologians from Pierre Abelard to Gabriel Biel. *Steinmetz*

335. The English Church in the Eighteenth Century. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. *Staff*

344. Zwingli and the Origins of Reformed Theology. Source studies in the early Reformed tradition. *Steinmetz*

HISTORICAL THEOLOGY

114. Christologies of the Early Church. Investigation of important soteriologies and debates centering upon the person of Christ from the second through the fifth centuries. *Gregg*

118. History of Nineteenth-Century Protestant Theology. Examination of major figures and theological issues of nineteenth-century Protestant theology in context with attention to the role of experience in theological reflection, faith, and historical consciousness, and faith and culture. *Fulkerson*

123. Readings in Historical Theology. Prerequisite: CH 13–14. *Staff*

139. Women, Theology, and the Church. Historical and theological consideration of the problem of gender. *Fulkerson*

201. Christian Thought in the Middle Ages. A survey of the history of Christian theology from St. Augustine to the young Martin Luther. *Steinmetz*

204. Origen. The systematic and apologetic writings of an important Alexandrian thinker and exegete of the third century. *Gregg*

219. Augustine. The religion of the Bishop of Hippo in the setting of late antiquity. *Gregg*

241. Problems in Reformation Theology. Prerequisite: permission of the instructor. *Steinmetz*

246. Problems in Historical Theology. Prerequisite: permission of the instructor. *Staff*

260. Life and Thought of the Wesleys. A seminar on John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. Prerequisite: permission of the instructor. *Staff*

261. The Theology of John Wesley. A study of the development and structure of Wesley's theology with special reference to his doctrines of man and salvation. *Richey*

308. Greek Patristic Texts. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. *Young*

313. The Apostolic Fathers. A study of the religious thought in the writings of the Apostolic Fathers. *Young*

317. Seminar in the Greek Apologists. A study of the apologetic writings of the Greek Fathers in relation to the challenges of their contemporary world. Special attention will be given to leading protagonists of late Graeco-Roman culture, such as Celsus, Porphyry, and Julian. *Young*

318. Seminar in the Greek Fathers. A study of selected topics from the Greek Fathers. *Young or Gregg*

337. Theology of St. Thomas Aquinas. Intensive reading in the *Summa Theologica* and biblical commentaries. *Steinmetz*

338. Calvin and the Reformed Tradition. The theological development of John Calvin. A comprehensive examination of his mature position with constant reference to the theology of the other reformers. *Steinmetz*

AMERICAN CHRISTIANITY

128. History of American Christianity. A consideration of the nature of Christianity in America and the history of its development. *Henry and Newsome*

127. Modern American Religious Leaders. Recent American Christianity as seen through selected biographical studies. *Newsome*

199. The American Social Gospel. A study of Protestant social thought and action in America since 1865. *Newsome*

296. Religion on the American Frontier. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. *Henry*

377. Contemporary American Theater and Evolving Theological Forms. An examination of creed and ritual implicit and explicit in contemporary American theater of stage, film, and television. *Henry*

384. Religious Dissent in American Culture. History and significance of dissent in the theology and culture of America. *Henry*

385. Religion in American Literature. A critical study of the meaning and value of religious motifs reflected in American literature. *Henry*

395. Christian Thought in Colonial America. Exposition of the main currents in Protestant theology. *Henry*

396. Liberal Traditions in American Theology. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. *Henry*

397. Contemporary American Theology. A critical appraisal of major tendencies.
Henry

HISTORY OF RELIGIONS

180. Introduction to Asian Religions. Preliminary consideration of problems and methods in the study of religious traditions, followed by a survey of the historical development, beliefs, practices, and contemporary significance of the Islamic religion and the religions of India, China, and Japan. *Staff (Department of Religion)*

See other courses offered in the Department of Religion.

III. Theological Studies

CHRISTIAN THEOLOGY

32. Christian Theology. The major themes of the theology of the Church. *Herzog, Langford, and Wainwright*

102. Science and Biblical Theism. Implications of scientific knowledge in relation to biblical understandings of creation, revelation, and providence. *Staff*

108. Major Types of Protestant Theology. A survey of Protestant theology from the reformers to Karl Barth. (For juniors only.) *Herzog or Langford*

110. This Life and the Age to Come. Christian eschatology and the meaning of history in the light of God's triumph over sin, suffering, and death. *Staff*

112. The Doctrine of the Holy Spirit. An examination of pneumatology under systematic categories which include: creation, Old Testament, prophecy, the life and ministry of Christ, the Church, salvation, the canon, the sacraments, and eschatology. *Turner*

124. Issues in the Wesleyan Theological Tradition. A study of selected historical and constructive themes. Specification of topics will be made at each time of offering. *Langford*

134. Theology of Pentecostalism. An exploration of this tradition with examination of its distinctive emphases and interpretations of Christian faith. *Turner*

200. The Person and Work of Christ. The problem of knowledge of Christ and formulation of a doctrine of his work and person in the light of biblical eschatology. *Staff*

210. Contemporary British Theology. Selected problems in representative British theological writings after 1900. *Langford*

211. Authority in Theology. The idea and function of authority in theology. *Langford*

215. The Nature and Mission of the Church. Christian understanding of the Church—biblical, historical, contemporary—with a view toward ecumenical doctrinal construction. *Herzog*

216. Kierkegaard Studies. Critical examination of selected works. *Staff*

217. Church and Sacraments. The basic teachings on church and sacraments, Biblical, historical, contemporary. *Herzog*

220. Theological Explorations. A seminar on contemporary theological issues, content to be designated by the theological division. *Staff*

225. The Christian Understanding of Human Nature and Destiny. Representative historical and recent theological interpretations of human nature, predicament, deliverance, and possibility. *Staff*

226. Theology and Contemporary Secular Understandings of Man. Critical theological examination of selected current interpretations of human nature and the human situation. *Staff*

229. Tragedy and Christian Faith. An analytical and constructive philosophical interpretation of the fundamental tragic dimension of human life in the light of a Christian theological understanding. *Staff*

249. The Lord's Prayer. By studying historic and contemporary expositions of the Lord's Prayer, the course provides an introduction not only to the doctrines of God, humanity, prayer, and the kingdom, but also to the variety of the Christian spiritual tradition in time and space. *Wainwright*

256. John Wesley in Controversial and Ecumenical Theology. A study of John Wesley and his theology both in his engagements with other confessional traditions, and in his views on such matters as church, ministry, sacraments, and authority. Consideration will also be given to these topics in relation to contemporary theology, especially "Faith and Order." *Wainwright*

272. Theology of Paul Tillich. An examination of Tillich's philosophical theology. *Staff*

279. Understandings of the Resurrection in Contemporary Theology. A study of recent literature on the resurrection of Jesus Christ from the angles of exegesis, historical criticism, hermeneutics, and systematic significance. *Wainwright*

300. Systematic Theology. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. Prerequisite: CT 32 or equivalent. *Herzog or Langford*

303. Philosophical Method in Religious Studies. European hermeneutic (Gadamer) and American process philosophy (Whitehead and Hartshorne) as applied to Christian theology. *Herzog*

320. Theology, Power, and Justice. Critical examination of a major theme of modern thought in Schleiermacher, Hegel, Marx, and Tillich. *Herzog*

322. Nineteenth-Century European Theology. Protestant theology from Kant to Herrmann. *Herzog*

325. Philosophical Theology I. Selected readings from Plato and Aristotle which helped to shape philosophical theology from Origen through Augustine and Aquinas. *Herzog*

326. Philosophical Theology II. Main problems of philosophical theology in the modern period.

328. Twentieth-Century European Theology. Critical examination of the thought of selected Protestant theologians from 1900 to 1950. Prerequisite: CT 32. *Herzog*

329. Readings in Theology and Language. Sample treatments of religious language in linguistic analysis, hermeneutical theory, literary criticism, liturgical practice, and fundamental theology. *Wainwright*

330. Contemporary Christologies. A seminar dealing with contemporary Roman Catholic and Protestant Christology. Readings and discussion will focus on theological proposals from major contemporary figures. *Wainwright*

331. Eschatology. A study of issues in individual, communal, and universal eschatology against the background of twentieth-century scholarly work in the kingdom of God. *Wainwright*

352. Seminar in Christian Theology. Research and discussion of a selected problem in the systematic field. *Staff*

CHRISTIAN ETHICS

33. Christian Ethics. Theological assumptions, ethical principles, and their application to contemporary issues of Christian social policy. *Beach, Lacy, and H. Smith*

107. The Biblical Bases of Christian Ethics. Examination of major themes and moral teachings, principally in the Decalogue, the Gospels, and the Epistles, with application to some contemporary issues. Prerequisite: OT 11, NT 18, or equivalent. *H. Smith*

112. Technology and Christian Ethics. The impact of the technological revolution upon American culture, and a normative Christian response. *Beach*

113. Contemporary Issues in Christian Morals. Constructive examination of selected areas of public and private morality. *Staff*

130. Dying and Death. Critical consideration of biblical, legal, medical, and ethical perspectives. Prerequisites: OT 11, NT 18, or equivalents. *Bailey, H. Smith, and others*

132. Revelation and Authority in the Church. Critical examination of an ontology of church, language, and practice. *H. Smith*

136. Perspectives on Food and Hunger. An interdisciplinary symposium on national and world hunger and malnutrition, including (whenever possible) student involvement in local hunger-related agencies. *Lacy and others*

194. The Protestant Church and American Culture. Analysis from the perspective of Christian ethics of current problems in the interpretation of church and culture with explicit reference to the parish setting. *H. Smith*

205. War in the Christian Tradition. An analysis of how Christians have understood and evaluated war. Particular attention to the question of whether war should not be regarded as a positive moral good. Works by Augustine, Aquinas, Bainton, Ramsey, Childress, Niebuhr, and Johnson will be considered. *Hauerwas*

220. Ethical Explorations. A seminar on contemporary ethical issues, the specific content in any given semester to be designated by the Theological Division. *Staff*

230. Moral and Value Education. A critical, theological investigation of Durkheim, Dewey, Simon, Kohlberg, Bull, Rokeach, and implications for education in church and society. Prerequisites: CHE 33 and CED 105. *H. Smith and Westerhoff*

242. Human Sexuality. Examination of biological, biblical, cultural, and other aspects of human sexuality, together with analytical and constructive interpretation. Permission of instructor required. *H. Smith*

244. Interdisciplinary Seminar in Medical-Legal-Ethical Issues. A seminar composed of students and faculty from the Medical, Law, and Divinity Schools for critical consideration of selected pertinent issues of mutual professional interest. Prerequisite: permission of instructor. *H. Smith and others*

245. Ethics in World Religions. Moral foundations, assumptions, and applications in such historic faiths as Hinduism, Buddhism, Confucianism, and Islam, in the light of Christian ethical perspectives. *Lacy*

262. Marxist Ideology and Christian Faith. Comparative examination of Communist and Christian doctrines such as man, society, sin, history and eschatology, together with an introduction to the contemporary dialogue. *Lacy*

290. Current Problems in Christian Social Ethics. A critical study of secularization, the technological revolution, and the ecological crisis. *Beach*

291. Historical Forms of Protestant Ethics. A survey of major types of Protestant ethical theory from Luther through contemporary figures. *Beach*

292. Happiness, the Life of Virtue, and Friendship. An investigation of the interrelation of these themes in selected authors. An examination of whether the loss of the interrelation of these themes accounts for some of the problems of modern philosophical and theological ethics. *Hauerwas*

294. Christianity and the State. "Civil religion" in its historic development and contemporary expressions in America. Christian ethical premises of democratic political theory and practice. The relationships of church and state. *Beach*

383. Moral Theology in the Twentieth Century. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. *H. Smith*

387. Ethical Method. Selected methodological issues in contemporary theological ethics. *H. Smith*

388. Ethics and Health Care. A critical study of selected aspects of modern biomedical technology with special reference to the ethical assumptions informing their development and practice. *H. Smith*

389. Christian Ethics and Contemporary Culture. A study of the interaction between Christian thought and current secular social theory. *Beach*

BLACK CHURCH STUDIES

100. Introduction to Black Theology. An examination of the historical roots of black theology with special attention to the treatments of traditional themes and problems in theology by black theologians and their rationale for the black theological enterprise. *Turner*

124. The Black Church in America. A consideration of the historical and theological development of the separate black Christian denominations in America with attention to some of the major leaders, black worship, and black preaching. *Newsome and Turner*

126. Black Religion and Social Conflicts in America. An examination of some of the reactions of black religious groups to the limits placed upon black people in American life, efforts made to break down racial barriers in society, and attempts to institutionalize black responses to such barriers. *Turner*

128. The Life and Thought of Martin Luther King, Jr. An examination of the life of Martin Luther King, Jr. as a minister and leader of the civil rights movement. *Newsome*

144. Selected Topics in Black Church History. An exploration of pivotal events, key issues, and persons in the development of the black church in America. Prerequisite: BCS 124 or permission of the instructor. *Newsome*

WORLD CHRISTIANITY AND ECUMENICS

124. The Christian World Mission. A study of theological foundations, guiding principles, and contemporary problems of the world Christian community. *Lacy*

133. The Expansion of Christianity. A survey of the spread of Christianity and the growth of the worldwide Church with special emphasis on nineteenth- and twentieth-century Protestantism in the non-Western world. *Lacy*

135. Contemporary Issues in the World Church. Analysis of political, social, cultural, and religious conditions in a selected area of the world, and of theological-ethical insights and perspectives within the indigenous Christian community. *Lacy*

137. Third World Theology. An examination of selected theological writings from Asia, Africa, and Latin America, comparing their perspectives and their unique contributions with the contemporary Christian thought. *Lacy*

156. The Ecumenical Movement. Its contemporary development, structures, activities, and problems, against the background of Church unity and disunity. *Lacy*

386. Christianity in Dialogue with Other Faiths. Contemporary currents of Christian thought as they relate to resurgent non-Christian religions and involve new formulations of a theology of mission. *Lacy*

IV. Ministerial Studies

THE CARE OF THE PARISH

128. Ministerial Leadership and Participative Skills. A study of the pastor's role as participant-facilitator with attention to organizational theory and facilitative skills employing the group workshop method of learning. *Ingram*

129. The Pastor as Consultant to Church Organizations. A consideration of the pastor's role as organizational consultant with special emphasis on data gathering, diagnosis, and intervention using experiential learning designs. *Ingram*

130. Planning and Directing the Church's Program. Principles of planning, organizing, staffing, directing, and evaluating the program of the local church. *Ingram*

142. Women and Ministry. Theological and practical issues related to women and ministry. *Staff*

147. The Pastoral Responsibility for Administration. A consideration of the major responsibilities of the pastor in the administration of the local church. *Ingram*

148. Christian Stewardship and Church Finance. A seminar to consider the principles of stewardship, education, budget-making, enlistment in church support and church financial management in theological perspective. *Ingram*

150. Church and Community. The structure and dynamic factors shaping the present-day community together with their import for the work of the church. *Wilson*

151. The Town and Country Church. The small church, the circuit church, circuit administration, larger parish and group ministry, and the town and country movement. *Wilson*

152. Evangelism As a Pastoral Concern. A study of the nature, purposes, and methods of contemporary Christian evangelism with special attention to the local church. *Ingram*

154. The Urban Church. The function, nature, program, and administration of the effective city church and of the urban minister's distinctive task. *Wilson*

155. Church Polity.

155B. The Baptist Churches

155C. The United Church of Christ

155D. The Presbyterian Churches

155E. The Christian Church (Disciples of Christ)

155F. The Episcopal Church

157. The Church and Social Change. A sociological study of the relationship of the Church to the process of social change, including the role of the Church as innovator, the Church as participant in social movements, method(s) of accomplishing change, and the religious leader as an agent of social change. *Wilson*

158. Contemporary Religious Sects. The nature, ideology, development, clientele, and role of contemporary religious sects; the process by which such sects develop into established organizations; and their relationship to the mainline churches. *Wilson*

159. Early Methodism: History, Theology, and Polity. A study of the character and development of Methodism, beginning with John Wesley and tracing important features of this tradition through the nineteenth century. *Langford and Wilson*

160. Twentieth-Century Methodism: History, Theology, and Polity. The development of the United Methodist Church, focusing on theological diversity and patterns of organizational life, with major concentration on the polity of this church as provided by the current *Discipline*. *Langford and Wilson*

179. Church Research. Methods of research and survey for the gathering, analysis, and interpretation of church and community data, together with preparation and use of denominational statistics. *Wilson*

189. The Multiple Staff Ministry. Group work, leadership, and organizational theories as applied to staff ministries in large church and cooperative parish settings. *Ingram*

220. Seminar in Contemporary Ministries. A seminar in patterns and issues of contemporary ministries, content to be designated by the Ministerial Division. *Staff*

CHRISTIAN EDUCATION

101. Faith and Nurture. Foundations in theology and educational theory for the teaching ministry of the Christian community. *Staff*

105. Education as a Pastoral Ministry. An introduction to catechetics or Christian nurture within the life of a faith community. *Westerhoff*

109. Ministries with Youth. An experimental approach to inventing strategies for church educational ministries with junior highs, senior highs, and older youth. Attention will be given to teaching methods, curriculum resources, confirmation, and various teaching settings. *Shockley*

132. Curriculum, Teaching, and Learning. A critical survey of the development of various church curriculum designs; an introduction to the learning and teaching process and selected instructional models; guidance in the construction of learning environments, the selection of teaching techniques, and the use of printed resources. *Shockley*

153. Education and Social Issues. An exploration of contemporary social issues and their relationship to education and to the church. *Shockley*

167. Adult Education and the Ministry of the Laity. A study of adult education and the ministry and mission of the laity in Church and world and the ministry of teaching in the lay renewal of the Church. *Staff*

169. Major Issues in Christian Education. Critical examination of selected issues in Christian education. *Staff*

175. Liturgy and Education. An examination of issues in Christian Education related to Baptism, confirmation, and eucharist, with special attention to sacramental preparation. *Westerhoff*

185. Religious Education and the Arts. The place and the effect of imagination in religion and education, and the use of the arts in religious education. *Westerhoff*

190. Pastor as Teacher. An applied course in the teaching-learning process and models, strategies, and methods for planning and designing education in the parish. *Westerhoff*

192. Ethnicity and the Church's Mission and Ministry. Applying the insights of cultural anthropology to evangelization and nurture. *Westerhoff*

193. Living Faiths and Christian Education. An exploration of Christian education in the light of the faiths of other persons with special attention to Judaism. *Westerhoff*

218. Research Seminar in Religion and Education. Various research techniques applied to issues in religion and education. Prerequisite: permission of instructor. *Westerhoff*

220. Colloquium in Religious Education. *Staff*

230. Moral and Value Education. A critical, theological investigation of Durkheim, Dewey, Simon, Kohlberg, Bull, Rokeach, and implications for education in church and society. Prerequisites: CHE 33 and CED 105. *H. Smith and Westerhoff*

231. Spiritual Formation. An introduction to spirituality, spiritual formation, and the development of a personal spiritual discipline. *Westerhoff*

233. Spiritual Direction. An introduction to spiritual direction with special attention to the *Spiritual Exercises* of St. Ignatius and discernment. Prerequisites: CED 231 and permission of the instructor. *Westerhoff*

PASTORAL PSYCHOLOGY

70. Group Process and Personal Identity. A small group experience to enhance personal growth and explore personal identity and interpersonal styles of relating. *Staff*

164. Pastoral Counseling in a Parish Setting. The local church as the setting for pastoral counseling. Lectures, group supervision, and student verbatim materials will be utilized. Prerequisite: currently placed in a field setting or permission of instructor. *Mickey*

170. Pastoral Conversation. A consideration of the nature of the pastor's conversation with people in the total caring ministry grounded in the person-centered understanding of personality processes and human relationship, using textual and conversational materials. *Goodling*

171. Pastoral Counseling. Consideration of the structures and processes of pastoral counseling; pastoral evaluation, referral, intake contract, goals, transference, termination, and other special problems. Prerequisite: permission of instructor. *Goodling*

172. Pastoral Care in Marriage and Family Life. Pastoral care in marriage and family life with special emphasis on premarital guidance within the context of the local church's program of family life education. *Goodling*

173. Psychotherapy and Sanctification. An analysis of structuring and growth processes in psychotherapy in the light of a Christian understanding of sanctification. *Mickey*

174. Theology and Personality Processes. Theological and psychological understandings of basic human experiences; explorations of the dynamics and values or religious practices, developmental concerns, self awareness. *Mickey*

175. Pastoral Care Ministries in Critical Human Situations. A seminar utilizing lectures by visiting professionals, case materials, resource films, and readings, to inform ministers on the casual factors, behavioral patterns, preventive and treatment programs, and the role of the church and minister in such problems as alcoholism, drug addiction, dying and death, juvenile offenses, marital crisis, suicide, mental retardation, sexual deviation, psychiatric disorders. *Goodling*

175A. Special Practicum Projects. For advanced students who want additional clinical experience under supervision in a pastoral care setting (inner-city; alcoholic rehabilitation; counseling; etc.). *Staff*

176. Pastoral Care and Persons in Institutions.

176B. Lectures by staff and ward visits at the Murdoch Center for the Mentally Retarded and the facilities in the Butner, North Carolina, complex (state hospital, alcoholic rehabilitation, training school). *Staff*

176C. Lectures by staff and ward visits at the Central Prison in Raleigh and related correctional facilities. *Staff*

176D. The Church's ministry to the elderly and homebound explored through lectures, case conferences, and visits to the elderly and homebound parishioners of local Durham churches. *Goodling*

177. Pastoral Care in the General Hospital Setting. An examination through intensive individual and group supervision, of the student's pastoral ministry to the ill, the dying, and the bereaved in the general hospital setting. (Not recommended for those planning to take PP 277.) *Staff*

178. Power and Restraint in the Parish. Exploring the nature of power and leadership in developing skills for local church ministry, utilizing theological, psychological, sociological insights. Verbatim materials. *Mickey*

180. Pastoral Care and Women. Lecture-discussions by staff and visiting professionals to aid in developong skill in the pastoral care of women. Issues addressed: moral development, sexual dynamics, dual career families, child and spouse abuse, women in leadership positions. *Mickey*

271. Marriage and Family. The psychodynamics of marital conflict and family problems; principles and procedures in marriage and family counseling. (For seniors and Th.M. candidates.) *Staff*

273. Seminar in Pastoral Theology: Theological Dimensions of Pastoral Counseling. The relationship of process theology and theological anthropology to pastoral counseling. *Mickey*

275. Individual Study in Pastoral Psychology. Selected readings in major issues in pastoral psychology issuing in a research or honors paper. *Staff*

277-A,B,C. Basic Clinical Pastoral Education. Units of Basic CPE offered in the summer, fall, and spring in programs accredited by ACPE. (Two course units each, maximum credit.) *Staff*

278. Psychological Theories of Personality. A systematic presentation of leading personality theories, with reference to developmental processes (motivation, cognition, learning, etc.) and their implications for Christian ministry. *Mickey*

281-A,B,C. Advanced Clinical Pastoral Education in Pastoral Care and Counseling. Pastoral care with inpatients and pastoral counseling of individuals, couples, families, and groups in a pastoral counseling center. (Two course units each.) *Staff*

PREACHING

30. Theology and Practice of Preaching. The development of a theology of preaching and methods of sermon construction, including preaching in class, critique, private conference, and local church evaluation. Prerequisite: OT 11 or NT 18 or permission of instructor. *Lischer*

161. Preaching and the Church Year. Preaching the lectionary texts in the context of the church's worship and calendar. The appropriate cycle of the lectionary will be followed. In-class preaching and evaluation. *Lischer*

162. The Rhetoric of Preaching. Literary forms in biblical and nonbiblical literature as components of and models for preaching. Metaphor, poem, parable, story, and dialogue in oral communication. In-class preaching and evaluation. Prerequisite: OT 11 or NT 18. *Lischer*

163. Theologies of Preaching. Significant theories of preaching from Augustine to the present. Seminar presentations and in-class preaching and evaluation. Prerequisite: PR 30 or permission of instructor. *Lischer*

165. Preaching as Public Address. A workshop on preaching and worship leadership organized around the principles of speech and effective communication. Extensive use of audio-visual recordings and private conferences. Prerequisite: PR 30 or permission of instructor. *Lischer*

180. From Text to Sermon. Preaching from Biblical sources. Emphasis upon the goal and methodology of exegesis, the hermeneutic problem, and verbal communication in the present. Prerequisite: OT 11 and NT 18. *Staff*

181. Advanced Sermon Analysis Seminar. A critical study, on the basis of selected sermons and student presentations, of principal and practical problems facing the contemporary preacher. *Staff*

182. Advanced Preaching: Practice and Evaluation. An advanced laboratory course for extra competence in the preparation, delivery, and evaluation of sermons. Prerequisite: PR 30 and permission of instructor. *Lischer and staff*

183. Preaching in the Black Community. A study of the style and content of black preaching with attention to the unique roles of black preachers in society. An analysis of the essential characteristic of preaching in the black church. *Staff*

186. Twentieth-Century Preaching. A study of contemporary preaching based on printed, recorded, audio- and video-taped sermons of leading homiletics of our age. *Staff*

187. Pre-Reformation Preaching. Sermons, handbooks, and other historical sources studied in relation to biblical preaching and the liturgical church, the problem of popular ministry, and the issues of Christian reform. Prerequisite: CH 13. *Lischer and staff*

188. Post-Reformation Preaching. A study of the theological trends and significant personalities in the preaching tradition from the sixteenth century to the present. *Lischer and staff*

193. Theology and Preaching. An examination of the relation of systematic theology and homiletical presentation. *Lischer*

196. Preaching in the Parish. A consideration of preaching in relationship to pastoral duties and the total task of ministry with attention to week-by-week preaching in the parish setting. Some attention will be given to funerals and crisis situations. *Staff*

WORSHIP AND CHURCH MUSIC

123. Baptism, Confirmation, and Renewal. Biblical, historical, and theological perspectives on the sacrament of Christian initiation. Issues related to the catechumenate, baptismal practice, confirmation, and rites of renewal will be examined with reference to the reform of the liturgy. *Eslinger*

141. The Church Year. An historical and practical study of the church year and lectionary with major attention to the ecumenical and United Methodist calendar. *Eslinger*

153. The Leadership of Worship. A practical utilizing a laboratory setting devoted to the development of styles of liturgical leadership appropriate to pastoral ministry. *Eslinger*

167. Baptism and the Lord's Supper. Study of these sacraments with attention given to major representative traditions and to varieties of present observance and practice. *Staff*

168. Worship in the Wesleyan Tradition. The history, development, and current trends in United Methodist worship along with practical experience and concerns related to worship leadership in United Methodist churches. *Staff*

178. Christian Worship. A survey of the history of Christian corporate worship. Examination of the major biblical, historical, and theological developments in worship from Old Testament times to the present. Readings in liturgical thought through the ages with comparative study of selected liturgical traditions. *Staff*

180. Church Music. A two-fold study including: (1) a survey of the great monuments of church music; (2) musicianship, song-leading, and basic conducting with an emphasis upon the selection and use of hymns and other music from the *Methodist Hymnal* in public worship. *Staff*

250. Advanced Seminar in Liturgical Studies. Reading and research in a selected area of liturgical study to be announced. *Staff*

251. Studies in Spirituality. A consideration of different dimensions of the spiritual life. *Staff*

V. Clinical Training and Internships

CLINICAL TRAINING IN PASTORAL PSYCHOLOGY

Students may earn up to two course credits for a quarter or unit of clinical pastoral education in programs accredited by the Association for Clinical Pastoral Education (ACPE).

Students involved in clinical training under the direct supervision of members of the pastoral psychology staff during the academic year should register for credit under PP 277 for two course units unless a course credit has already been received for PP 177, in which case only one rather than two credits will be granted for the CPE quarter. Students should apply for such training through the Director of Clinical Pastoral Education.

Students involved in clinical training in summer CPE quarters should register with ACPE and the Associate Dean for Curricular Affairs as soon as accepted for training by a chaplain supervisor. Upon the receipt of a supervisor's report at the end of the training period the student will receive two course units of transfer credit.

INTERNSHIPS

In consultation with the Director of Field Education and the Associate Dean for Curricular Affairs, an individually designed internship may be developed in a partic-

ular ministerial vocational area of interest. Under certain circumstances it may be possible to earn one unit of field education and two course credits through such internships. Such programs must be formulated and recorded in advance in the offices of both field education and curricular affairs.

125–126. Special Ministry Internship. When a student needs to develop professional competencies in a highly specialized form of ministry, the Director of Field Education will assist in designing an appropriate learning contract and in negotiating for a suitable placement setting, provided the arrangements meet the basic criteria approved by the Field Education Committee.

131–132. Ministry through Social Agency Internship. A twelve-month placement in a regular personnel position in a social service agency to meet the job description of the agency and to develop a personal mode and style of ministry in a secular setting through understanding, appreciation, involvement in, and critical theological reflection upon environment, structures, values, and decision-making processes as conveyed by the conduct of the agency.

137–138. Parish Ministry Internship. A twelve-month placement, individually designed to engage the student in specified learnings in a wide variety of ministry functions in a local parish, under qualified supervision and using the guidelines of a learning contract.

143–144. Campus Ministry Internship. A nine-to twelve-month placement in approved locations designed to provide special learnings in delivering a ministry to college students under qualified guidance and utilizing a learning contract which specifies seminars, a personal journal, directed reading, and consultations to develop competency in these functions.

175–176. Clinical Pastoral Education Internship. A twelve-month placement in a clinical program accredited by the Association for Clinical Pastoral Education (ACPE).

197–198. Mission Internship. A special internship to prepare for service in church missions may be arranged by enlisting in the national or overseas program of the United Methodist Board of Global Ministries for one to three years. As a requirement for agency planning, applications should be initiated in the fall of the middler year. Other denominational and/or work-study experiences abroad may be given field education credit by special arrangement with the Director of Field Education.

Department of Religion—Graduate Courses

The following courses are offered periodically in the Graduate Department of Religion by Department of Religion faculty and may be taken by divinity students with permission of the instructor.

217. Islam in India

219. Augustine

221. Reading in Hebrew Biblical Commentaries

230. The Meaning of Religious Language

231. Seminar in Christianity and Contemporary Thought

233. Modern Narrative and Religious Language

243. The Archaeology of Palestine in Biblical Times

244. The Archaeology of Palestine in Hellenistic-Roman Times

248. The Theology of Karl Barth

252. Nineteenth- and Twentieth-Century Roman Catholic Theology

254. Introduction to African Religions

255. Seminar in African Religions

258. Coptic

- 264. The Sociology of the Black Church
- 265. The Religions of the West Africa Diaspora
- 280. The History of Religions
- 281. Phenomenology and Religion
- 284. The Religion and History of Islam
- 301. Seminar in Contemporary Christian Ethics
- 302. Studies in Intertestamental Literature
- 304. Aramaic
- 304A. Targumic Aramaic
- 306. Language and Literature of the Dead Sea Scrolls
- 310. Readings in Judaica
- 323. A-B. Comparative Semitic I-II
- 324. Readings in the History of Religion
- 360. Special Problems in Religion and Culture
- 370. Seminar in Religion and Literature
- 380. Existentialist Thought

Appendix

ENROLLMENT SUMMARY 1984-85

Divinity School Students, total 380		
331	M.Div.	(229 men, 102 women)
15	M.R.E.	(4 men, 11 women)
13	Th.M.	(10 men, 3 women)
21	Special	
	Students	(11 men, 10 women)
Graduate Division of Religion Students, total 53		
3	M.A.	
50	Ph.D.	
Total: 433		

DENOMINATIONS REPRESENTED 1984-85

United Methodist	280	Baptist Bible Fellowship	1
Presbyterian Church in the USA	20	Church of Christ	1
Episcopal	14	Evangelical Covenant	1
United Church of Christ	9	Freewill Baptist	1
Southern Baptist	7	Independent Baptist	1
Baptist	5	Lutheran Church of Bavaria	1
Christian Church (Disciples of Christ)	5	Methodist Church of Great Britain	1
Roman Catholic	5	Presbyterian Church in Chile	1
African Methodist Episcopal	4	United Holy Church of America	1
African Methodist Episcopal Zion	3	United Methodist Church in Chile	1
Christian Methodist Episcopal	2	United Methodist Church in Liberia	1
Lutheran Church of America	2	United Methodist Church of Zimbabwe	1
American Church of Australia	1	Unitarian Universalist	1
Assemblies of God	1	Unaffiliated	9

GEOGRAPHICAL DISTRIBUTION 1984-85

North Carolina	164	Connecticut	2
Virginia	41	Iowa	2
Florida	14	Kentucky	2
South Carolina	14	Maine	2
Tennessee	14	Massachusetts	2
Texas	10	Washington	2
Arkansas	9	Washington, DC	2
Georgia	9	Delaware	1
Indiana	9	Kansas	1
Ohio	9	Mississippi	1
New Jersey	8	Rhode Island	1
New York	7	Vermont	1
Pennsylvania	7	Wisconsin	1
Alabama	6	Foreign:	
Maryland	6	Australia	1
California	5	Chile	2
Illinois	5	Great Britain	1
West Virginia	5	Liberia	1
Minnesota	4	West Germany	2
Michigan	3	Zimbabwe	1
New Mexico	3		

INSTITUTIONS REPRESENTED

Akron University	1	Furman University	3
Albion College	1	Georgetown College	1
Albright College	1	Georgia State University	1
Allegheny College	1	Georgia Technological University	1
Appalachian State University	6	Greensboro College	8
Arkansas State University	1	Greenville College	1
Asbury College	6	Hamline University	1
Atlantic Christian College	12	Hampton Institute	1
Australia College of Theology	1	Harvard University	2
Averette College	3	Hendrix College	5
Ball State University	1	High Point College	7
Barrington College	1	Hollins College	1
Belmont Abbey College	1	Houghton College	2
Berea College	1	Huntingdon College	5
Birmingham Southern College	5	Illinois Wesleyan University	1
Bluefield State University	2	Indiana Central University	1
Bonn University	1	Indiana State University	2
Boston University	3	Indiana University	2
Brown University	1	Iowa State University	1
California State University		James Madison University	2
-Hayward	1	John Wesley College	1
-San Bernadino	1	LaGrange College	2
Carleton College	1	Lambuth College	4
Castleton State College	1	Lincoln Christian Seminary	1
Catholic University of America	2	Livingston College	1
Claflin College	1	Lynchburg College	3
Clemson University	1	McMurray College	3
Clinch Valley College	1	Marquette University	1
Coker College	1	Mars Hill College	3
Colgate University	1	Marshall University	4
College of William and Mary	3	Mary Baldwin College	1
Colorado College	1	Massachusetts Institute of Technology	1
Columbia Graduate School of Bible and Missions	1	Meredith College	4
Columbia Teachers College	1	Methodist College	7
Converse College	2	Middle Tennessee State University	1
Cumberland College	3	Middlebury College	1
Dartmouth College	1	Mississippi College	1
Davidson College	2	Moorehead State University	1
Denison University	1	Morgan State University	1
DePauw University	3	Mount Saint Clare College	1
Dickinson College	1	Muhlenburg College	1
Drew University	1	New Mexico State University	3
Duke University	18	North Carolina A & T State University	2
Earlham College	1	North Carolina Central University	3
East Carolina University	3	North Carolina State University	4
East Tennessee State University	3	North Carolina Wesleyan College	2
Eastern Kentucky University	1	North Park Theological Seminary	1
Eastern Mennonite College	1	Northern Illinois University	2
Eckerd College	1	Northwestern University	2
Elon College	4	Oberlin College	1
Emory and Henry College	5	Ohio State University	2
Erlangen University	1	Ohio Wesleyan University	1
Erskine College	2	Old Dominion University	1
Fayetteville State University	1	Oral Roberts University	1
Ferrum College	2	Otterbein College	2
Finch College	1	Paul Quinn College	1
Florida Southern College	3	Pennsylvania State University	2
Florida State University	4	Pembroke State University	3
Fort Hays State University	1	Pepperdine University	2
Francis Marion College	1	Pfeiffer College	9
		Pomona College	1

Princeton Theological Seminary	2	University of Minnesota	1
Princeton University	1	University of Mississippi	1
Purdue University	1	University of New Hampshire	1
Queens College	1	University of North Carolina-Asheville	1
Radford University	1	University of North Carolina-Chapel Hill	27
Randolph-Macon College	1	University of North Carolina-Charlotte	1
Sam Houston State University	1	University of North Carolina-Greensboro	4
Saint Augustine's College	1	University of North Carolina-Wilmington	4
Scarritt College	1	University of Notre Dame	2
Seton Hall University	1	University of Pittsburgh	1
Shaw College	1	University of Richmond	1
Simpson College	1	University of South Carolina	1
Smith College	1	University of South Florida	1
Southern Illinois University	1	University of Southern Maine	1
Southern Methodist University	1	University of Tennessee-Chattanooga	1
Southern University at Memphis	1	University of Tennessee-Knoxville	2
Southeastern Baptist Theological Seminary	2	University of Texas	1
St. Andrews Presbyterian College	3	University of Virginia	3
St. Olaf College	1	University of Washington	1
State University of New York		University of West Florida	1
- at Stony Brook	1	University of Wisconsin	3
Stetson University	1	University of Wisconsin at Eau Claire	1
Taylor University	2	Valparaiso University	1
Tennessee Technical University	2	Vanderbilt University	1
The Citadel	1	Vassar College	2
Trinity College	1	Virginia Commonwealth University	1
Union University	1	Virginia Polytechnic Institute	
United States Coast Guard Academy	1	and State University	3
United States Military Academy		Virginia Wesleyan College	3
- at West Point	1	Wabash College	1
United Theological Seminary	1	Wake Forest University	7
United Wesleyan University	2	Washington State University	1
Universidad de Chile	1	Washington University	2
University of Alabama	2	Wellesley College	1
University of Arkansas	2	West Virginia University	3
University of Central Arkansas	2	West Virginia Wesleyan College	1
University of Denver	2	Western Carolina University	4
University of the District of Columbia	1	Western College of Advanced Education	1
University of Durham	1	Wheaton College	1
University of Florida	1	Wichita State University	1
University of Georgia	3	Wingate College	2
University of Houston	1	Winthrop College	1
University of Houston/Clear Lake City	1	Wofford College	1
University of Louisville	1	Woodrow Wilson Law School	1
University of Maryland	1		

ENROLLMENT 1984-85

Candidates for the Master of Divinity Degree

Adams, Brian K. (B.A., McMurry College), Amarillo, Texas
Adams, Sharon LaVonda (A.A., Sandhills Community College; B.A., University of North Carolina-Chapel Hill), Raeford, North Carolina
Amory, Michael Thomas (B.S., West Virginia University), Hurricane, West Virginia
Anderson, Howard Emory, III (B.A., Methodist College), Wilmington, Delaware
Andrews, William Mark (B.S., Greensboro College), Durham, North Carolina
Angel, Andrew Stephen (B.A., Ohio State University), Sunbury, Ohio
Armstrong, James McCoy (B.S., University of North Carolina-Chapel Hill), Hickory, North Carolina
Armstrong, Jay Allen (B.B.A., New Mexico State University), Alamogordo, New Mexico
Armstrong, Kevin R. (B.A., DePauw University), Washington, Indiana
Bagwell, Robert Randall (B.A., Furman University), Easley, South Carolina
Bailey, James H., Jr. (B.A., Randolph-Macon College), Greenville, North Carolina
Baker, Charles W., Jr. (B.A., University of North Carolina-Chapel Hill), Charlotte, North Carolina
Baldwin, Penelope Lane (B.S., University of New Hampshire), New Haven, Connecticut
Ball, Barry Douglas (B.A., The Citadel), Greensboro, North Carolina
Barber, David Arthur (B.S., M.S., Ph.D., University of Wisconsin), Raleigh, North Carolina

Barden, Mark L. (M.A., University of Mississippi; B.S., Oral Roberts University), Greensboro, North Carolina

Bell, Luke (B.A., University of West Florida), Monroeville, Alabama

Betsworth, David Allen (B.A., Simpson College), Indianola, Iowa

Bishop, Mary Beth (B.A., Colorado College), Houston, Texas

Bland, Linda Adams (B.A., M.A., Wake Forest University; M.A.T., Duke University), Elon College, North Carolina

Bollinger, Ethel C. (A.B., University of Georgia), Durham, North Carolina

Bond, Luther G., II (B.S., Ferrum College), Baltimore, Maryland

Bone, Jesse Virgil, Jr. (B.A., University of North Carolina-Chapel Hill), Spring Hope, North Carolina

Boose, George Nathaniel (B.A., High Point College), Winston-Salem, North Carolina

Bowden, Julia Webb (B.A., Huntingdon College), Atlanta, Georgia

Bradley, Neil Anthony (B.B.S., University of Maryland; M.Ed., University of Virginia), Timberlake, North Carolina

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Broadway, Katherine Jean (B.S., Tennessee Technological University), Raleigh, North Carolina

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Bulletin of Duke University

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bulletin of
Duke University 1985-86

Information and Regulations

**Trinity College of Arts and Sciences
The School of Engineering**



THE DUKE STUDENT HONOR COMMITMENT

A unique aspect of a liberal education is its attempt to instill in the student a sense of honor and high principles that extends beyond academics. An essential feature of Duke University is its commitment to an atmosphere of integrity and ethical conduct. As a student of Duke University I accept as my personal responsibility the vigorous maintenance of high standards of honesty, truth, fairness, civility, and concern for others.

My devotion to integrity establishes that I will not cheat in academic work, and that I will adhere to the established and required community code of conduct. According to the dictates of my own conscience, I will report behavior in violation of such established standards. In addition, and beyond the requirements of any code or law, I confirm my own commitment to personal honor and integrity in all matters large and small. Even though the ideal of honor is an abstract one, by implementing this ideal, I join the men and women of Duke University in making the concept of honor a reality.

The Duke Student Honor Commitment was developed by students of the Class of 1982, approved through a student-wide referendum and presented to President Sanford at graduation (May, 1982). The President's Honor Council was created the following year to promote and represent the ideals embodied by the Honor Commitment.

The Duke Student Honor Commitment differs from other university honor codes in one fundamental way: it is strictly a personal commitment that is not enforceable by any judicial or regulatory action. Each student is responsible for thoughtfully determining his or her own concept of honor and then adhering to that standard according to his or her conscience. It is hoped that your concept of honor will develop and mature during your Duke career.

It is the goal of the President's Honor Council to help establish and reinforce the Duke Student Honor Commitment as a cherished tradition of Duke University. We trust that the accumulation of individual acceptances of the Honor Commitment will achieve this goal.

bulletin of
Duke University 1985-86

Information and Regulations

**Trinity College of Arts and Sciences
The School of Engineering**

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University Calendar, 1985-86

Fall, 1985

August	
21	Wednesday. Orientation begins. Assemblies for all new undergraduate students.
26	Monday, 8:00 A.M. fall semester classes begin.
27	Tuesday, 4:00-6:00 P.M. Drop/Add begins, Intramural Building.
28-30	Wednesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., Drop/Add continues, 103 Allen Building.
September	
2	Monday, Labor Day. Classes in session.
3-6	Tuesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M. Drop/Add continues, 103 Allen Building.
October	
11	Friday. Last day for reporting midsemester grades. 6:00 P.M.. Fall break begins.
16	Wednesday, 8:00 A.M. Classes resume.
November	
4-7	Monday-Thursdlay. Registration for spring semester, 1986, 103 Allen Building.
22	Friday, 6:00 P.M. Thanksgiving recess begins.
December	
2	Monday, 8:00 A.M. Classes resume.
6	Friday, 6:00 P.M. Fall semester classes end.
7-9	Saturday-Monday. Reading period
8	Sunday. Founder's Day.
10	Tuesday. Final examinations begin.
16	Monday. Final examinations end.

Spring, 1986

January	
3	Friday. Orientation begins.
7	Tuesday. Registration and matriculation of new undergraduate students.
8	Wednesday, 8:00 A.M. Spring semester classes begin.
9	Thursday, 4:00-6:00 P.M. Drop/Add, Intramural Building.
10	Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M. Drop/Add, 103 Allen Building.
13-17	Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M. Drop/Add continues, 103 Allen Building.
February	
14	Friday. Last day for reporting midsemester grades.
28	Friday, 6:00 P.M. Spring recess begins.
March	
10	Monday, 8:00 A.M. Classes resume.
24-26	Monday-Wednesday. Registration for fall semester, 1986, and beginning of registration for summer terms.
April	
18	Friday, 6:00 P.M. Undergraduate classes end.
19-21	Saturday-Monday. Undergraduate reading period.
22	Tuesday. Final examinations begin.
28	Monday. Final examinations end.
May	
3	Saturday. Commencement exercises begin.
4	Sunday. Graduation exercises. Conferring of degrees.

University Administration

General Administration

H. Keith H. Brodie, M.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
William G. Anlyan, M.D., D.Sc., *Chancellor for Health Affairs*
Eugene J. McDonald, LL.M., *Senior Vice-President for Administration*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, B.A., *Vice-President for Development and Alumni Affairs*
William L. Green, Jr., A.B., *Vice-President for University Relations*
Stephen Cannada Harward, A.B., C.P.A., *Treasurer and Assistant Secretary*
J. Peyton Fuller, A.B., *Associate Vice-President and Corporate Controller*
Roger L. Marshall, A.B., *Secretary of the University*
Andrew G. Wallace, M.D., *Vice-Chancellor for Health Affairs*
Joel L. Fleishman, LL.M., *Vice-Chancellor*
Patricia C. Skarulis, M.A., *Vice-Chancellor for Information Systems*
R. James Henderson, M.Ed., *Associate Vice-President and Business Manager*

Trinity College of Arts and Sciences

Richard White, Ph.D., *Dean*
Albert F. Eldridge, Ph.D., *Associate Dean*
Virginia Bryan, Ph.D., *Assistant Dean*
Martina Bryant, Ed.D., *Assistant Dean*
Elizabeth S. Nathans, Ph.D., *Assistant Dean*
Mary Nijhout, Ph.D., *Assistant Dean*
Brian Q. Silver, Ph.D., *Assistant Dean*
Gerald L. Wilson, B.D., Ph.D., *Assistant Dean*
Ellen W. Wittig, Ph.D., *Assistant Dean*

The School of Engineering

Earl H. Dowell, Ph.D., *Dean*
Marion L. Shepard, Ph.D., *Associate Dean*
B. Jefferson Clark, B.S.E., M.B.A., *Assistant Dean and Director of External Affairs*

Student Affairs

William J. Griffith, A.B., *Vice-President for Student Affairs*

Counseling and Psychological Services

Jane Clark Moorman, M.S.W., ACSW, *Clinical Social Worker and Director*
John C. Barrow, Ed.D., *Psychologist*
Tina D. Bell, M.S.W., ACSW, *Clinical Social Worker*
Rolffs S. Pinkerton, Ph.D., *Psychiatrist*
Kenneth Rockwell, M.D., *Psychiatrist*
Elinor T. Roy, M.S.W., ACSW, *Clinical Social Worker and Assistant Director*
Joseph E. Talley, Ph.D., *Psychologist*

Cultural Affairs

Susan L. Coon, M.A., *Director*

International House

Brian Q. Silver, Ph.D., *Director and International Adviser*

Health, Physical Education, and Recreation

John A. Friedrich, Ph.D., *Chairman and Professor*
Albert Buehler, M.A., *Professor, Track Coach, and Assistant Director of Athletics*
Ruth B. Eddy, M.S., *Associate Professor and Assistant Sports Club Director*
Charles D. Harris, Ph.D., *Lecturer and Assistant Director of Recreation and Facilities*
William J. Harvey, M.Ed., *Associate Professor and Head Wrestling Coach*
John LeBar, Ph.D., *Associate Professor*
Jane M. Lloyd, M.A., *Associate Professor and Director of Sports Clubs*
Beverly L. McCraw, M.A., *Lecturer*
Kenneth A. Miller, *Assistant Instructor and Women's Gymnastics Coach*
Wayne Pollard, B.S., *Assistant Instructor of Scuba*
Calla A. Raynor, M.A.T., *Associate Professor*

John D. Riebel, M.Div., Associate Professor, Physical Therapist, and Director of Freshman Program
Leroy C. Skinner, M.A., Associate Professor and Director of Intramurals
Dorothy Splanger, M.A., Associate Professor and Director of Undergraduate Studies and East Campus Program
Jean Trout, B.A., Part-time Instructor
John Wilson, Assistant Instructor and Volleyball Coach
Alma L. Woodyard, M.Ed., Associate Professor and Assistant Director of Athletics

Minority Affairs

Caroline L. Lattimore, Ph.D., Dean

Placement Services

Patricia O'Connor, Ed.D., Director
Johnnie Lawrence, Assistant Director
Laurence P. Maskel, Ph.D., Assistant Director
Lillian Lee, M.S.Ed., Placement Officer
Amanda S. McBride, M.Ed., Career Counselor

Religious Life

William H. Willimon, Ph.D., Minister to the University
Nancy A. Ferree, M.Div., Assistant Minister to the University
Mary Parkerson, A.B., Chapel Development Officer and Administrative Assistant to the Minister to the University
George Drum, Ph.D., Inter-Varsity Leader
Joseph A. Burke, Ph.D., Chaplain to Catholic Students
Velma Ferrell, B.D., Chaplain to Baptist Students
Hubert F. Beck, M.Div., Chaplain to Lutheran Students
Frank A. Fisher, M.A., Chaplain to Jewish Students
Earl H. Brill, Ph.D., Chaplain to Episcopal Students
Michael D. Weber, M.Div., Chaplain to United Methodist Students
John Hamilton, M.A., Navigators Staff Person
Carl J. Broggi, B.S., Campus Crusade for Christ Representative

Residential Life

Richard L. Cox, M.Div., Th.M., Ed.D., Dean
Ella E. Shore, M.R.E., M.A., Associate Dean
Karen L. Steinour, Ph.D., Assistant Dean
Benjamin Ward, Ph.D., Assistant Dean
Richard Timothy Baden, B.A., Assistant to the Dean
David W. Jamieson Drake, M.Div., Assistant to the Dean
Leslie Monfort Marsicano, M.Div., Assistant to the Dean
Frank H. McNutt, B.A., Assistant to the Dean
Barbara L. Bushman, A.B., Coordinator, Student Housing

Student Activities

Homai McDowell, M.M.S., D.B.A., Director
Sandy Kopp, M.Ed., M.Div., Financial Manager

Student Health

Howard J. Eisenson, M.D., Director
Penny Sparacino, R.N., Nursing Supervisor, University Infirmary

Student Life

Suzanne Wasiolek, M.H.A., Dean
W. Paul Bumbalough, A.B., Assistant to the Dean

University Union

Jake Phelps, B.A., Director
Peter Coyle, A.B., Associate Director
Krista Cipriano, B.F.A., Coordinator, Arts and Crafts Center
Gay Llewellyn, Program Adviser
Gloria Wagner, Financial Adviser

Student Services



A number of resources within the University are relied upon by undergraduate students for counseling and information relating to both academic and personal matters. In addition, the University provides a variety of services for students in areas such as health care and postgraduate employment. Some of these resources and services are available through the office of the individual schools and college; others are provided by University-wide offices and departments. For additional information consult the *Bulletin of Undergraduate Instruction*.

Administrative Offices of Schools and Colleges

TRINITY COLLEGE OF ARTS AND SCIENCES

The Dean of Arts and Sciences and the Dean of Trinity College, Dr. Richard White. The Dean of Arts and Sciences acts as the University's chief academic and executive officer for the Arts and Sciences departments (some thirty in number) and for selected interdisciplinary problems.

The Dean is responsible for developing and maintaining the quality of the academic programs in Arts and Sciences in consultation with appropriate faculty and students and for planning and organizing efforts to generate funds for the operation of the departments and programs. The Dean recommends to the Provost policies and budget needs concerning their academic affairs and implements the policies and acts as chief budget officer in relation to them.

That one person holds both Deanships makes it possible to maintain the necessary coordination of educational policies and standards with respect to both faculty and students.

The Associate Dean of the College, Albert F. Eldridge. The Associate Dean of the College reports to the Dean and has direct responsibility for the day-to-day operations of the college. The Associate Dean meets with the Assistant Deans of Trinity College of Arts and Sciences to coordinate their decision making and planning. Primary responsibility for academic advising is assigned to the Associate Dean, who directs the work of the various academic advising programs of the college. The Associate Dean works directly with the Dean and other administrative officers to help plan new academic programs and to offer advice in the assessment of existing programs and the quality of instruction.

Assistant Deans Virginia Bryan, Martina Bryant, Elizabeth Nathans, Mary Nijhout, Brian Silver, Gerald Wilson, Ellen Wittig. The Assistant Dean for Freshmen and Premajor Sophomores directs the College's Premajor Advising Center and, with the center's staff, counsels students as they make the transition to university work

and as they begin to identify their curricular interests and to develop their academic plans. Upperclassmen are assigned to an Assistant Dean on the basis of their major field of study. The deans advise on academic programs, courses, and requirements for graduation and careers. They help students develop plans for options in the undergraduate program; for example, study abroad, living-learning programs, and pre-professional programs. The academic deans also provide information on graduate schools, scholarships, fellowships, and other information pertinent to postgraduate programs.

These academic deans assist the Dean and Associate Dean in curriculum development, academic programs, and maintaining high academic standards. They help develop and implement educational programs through their work on committees of the Undergraduate Faculty Council of Arts and Sciences. The Assistant Deans' offices also serve as clearinghouses for academic procedures such as approvals of leaves of absence, courses to be taken elsewhere, the dropping and adding of courses, and withdrawals from college.

THE SCHOOL OF ENGINEERING

Dean Earl H. Dowell. The Dean of the School of Engineering has overall responsibility for instruction and research in the school as well as for the educational experience and welfare of its students. The Dean works with various constituencies including the University administration, faculty, students, and alumni on matters of general policy and delegates responsibilities within the school to members of his staff.

Associate Dean Marion L. Shepard. The Associate Dean has responsibility for academic matters pertaining to undergraduates, and for working with the academic departments in helping to establish student's programs of study. He counsels with freshmen before they arrive on campus, and through summer correspondence with them, assists in making preliminary selection of courses for the fall semester. He also plans and directs the orientation of the freshmen. Under his supervision, engineering faculty members serve as advisers to students. He approves leaves of absence, courses to be taken elsewhere, the dropping and adding of courses, academic probation, dismissal or withdrawal from the school, transfer into or out of the school, and similar matters. He serves as the Dean's deputy in representing the school on campus, among alumni, friends, supporting industries, and governmental organizations. He also provides primary liaison with the Office of Placement Services.

Assistant Dean B. Jefferson Clark. The Assistant Dean and Director of External Affairs has primary responsibility for directing capital fund and other development activities for the school, and for coordinating alumni affairs. He also bears primary responsibility for relations with industry.

FACULTY ADVISING

Apart from academic counseling of students by faculty members whom they come to know on an informal basis, faculty advising of undergraduates in Trinity College and the School of Engineering takes place in three primary ways. First, in Trinity College of Arts and Sciences, faculty members serve in the Premajor Advising Center as general academic advisers to groups of freshmen and premajor sophomores and are available for individual conferences throughout the semester. In the School of Engineering, freshmen and sophomores are counseled by special faculty advisers before the students choose their department. And third, in all departments, the director of undergraduate studies is available to assist students concerning the more technical academic matters pertaining to their departments.

Student Affairs

Vice-President for Student Affairs, William J. Griffith, 106 Flowers. The Vice-President for Student Affairs has the ultimate responsibility for most noncurricular aspects of a student's activity and welfare and works directly with the following offices in fulfilling that responsibility.

Counseling and Psychological Services, Jane Clark Moorman, Director, Suite 214 Old Chemistry. The CAPS staff provides a coordinated and comprehensive range of counseling and psychological services to meet the unique needs of individual students in regard to their own personal development.

Services are available to all undergraduate, graduate, professional, and allied health students enrolled in Duke and include evaluation and counseling/psychotherapy regarding personal concerns of a wide variety. These include family, social, academic, career, and sexual matters. Vocational/educational interest tests are available.

CAPS also offers short-term seminars and groups focusing on personal skills. These groups have the advantage of pooling resources and support while at the same time teaching skills. In the past, such groups have covered coping with stress and tension, exploring career goals, assertiveness, couples communication, and understanding eating disorders. However, other seminars may be offered to meet student interest.

The professional staff is composed of psychologists, clinical social workers, and psychiatrists who are experienced in working with young adults. Individual, couples, and group counseling and psychotherapy are utilized in helping students resolve their concerns once the student and staff member have identified together the most helpful alternative.

Standardized testing is also administered for the University community by CAPS, including graduate and professional school tests such as the LSAT, MCAT, and GRE, as well as a number of professional licensing examinations. CAPS maintains a library which includes a wide selection of vocational and educational program resource materials to assist students in choosing a career and/or further training programs in graduate or professional study. The library is available for all Duke students whether they are involved in counseling or not.

Another important function of CAPS is the availability of the staff to the entire University community for consultation and educational activities regarding student development and mental health issues affecting not only students, but the campus community as a whole. The staff works with other campus personnel including administrators, faculty, resident advisers, Student Health Service staff, Religious Life staff, the Office of Placement Services, Freshman Advisory Counselors, PISCES, Project Wild and other student groups in meeting whatever needs of students are identified through such liaisons.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with CAPS staff members. Such information can be released, however, upon the student's specific written authorization.

Initial evaluation and brief counseling/therapy, as well as career and skills development seminars are covered by the student health fee. There are no additional costs for these services. If appropriate, a referral may be made to other staff members or a variety of local resources including multidisciplinary mental health professionals in private practice and clinic settings.

CAPS offices are centrally located in Suite 214, Old Chemistry Building on the West Campus. Appointments may be made by calling 684-5100 Monday through Friday between 8 A.M. and 5 P.M. However, if a student's concern needs immediate attention, that should be made known to the secretary, and every effort will be made to arrange for a counselor to talk with the student immediately.

Office of Cultural Affairs, Susan Coon, Director, 109 Page. The Office of Cultural Affairs, located just off the entrance of Page Auditorium, is responsible for the creation, coordination, and implementation of many of the cultural and popular entertainments which take place on the campus. The office is directly responsible for the Duke Artists Series and Quadrangle Pictures (35 mm film program); it also schedules the use of Page Auditorium and directs the use of this hall. For the Summer Session Office, Ms. Coon directs ARTSFARE, The D.U. Summer Festival of the Arts, and works with the Institute of the Arts in developing programs supported by the Mary Duke Biddle Foundation both on the campus and in the community. Performances relating to campus, drama, music, and arts organizations are facilitated through this department's Page Box Office, which also serves all other programs. In addition to these arts-related activities, the Duke University Calendars (both yearly and weekly editions) are published and distributed from this office. In order to avoid conflicts, all campus events should be recorded by the calendar office as early as possible.

The Department of Health, Physical Education, and Recreation, John A. Friedrich, Chairman, 105A Card Gym. The department believes that good health is the most valuable possession. To enable students to maintain and improve their health and fitness it offers many excellent opportunities for all students to engage in healthful physical activity and lifetime leisure sports. Opportunities are available in sports clubs, intramurals, and recreation. There is also a wide variety of both activity and theory courses taught in the physical education department.

International House, Brian Q. Silver, Director, 2022 Campus Drive. International House is the center of cocurricular programs of an international nature at Duke. Established in 1964, International House now includes a variety of programs of interest both to (1) the approximately 300 international students who come to Duke each year from more than 70 countries, and (2) American students who are interested in other cultures, or who are considering travel or study outside the United States.

Programs which assist students from abroad in participating in the life of the Durham and Duke communities include an intensive orientation program at the beginning of the academic year; the Host Family Program, in which interested international students may become acquainted with American families; the International Wives Club, which provides a structure for international women to meet with American women in an informal atmosphere; and the Speakers Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community.

The International Office, located on the second floor in International House, assists students and faculty from abroad in fulfilling the various immigration and tax formalities involved in coming to Duke.

The International Association, consisting of both international and American members, plans social and cultural programs which emphasize personal contact and the informal exchange of ideas among students from diverse backgrounds. Included are parties, pot-luck dinners, intramural and recreational sports, lectures, and an open house every Saturday evening from 7:30 to 9:00 P.M. at International House. The highlight of the association's year is International Day, scheduled after spring break.

The International Living Group, (I.L.G.), located in Alspaugh Hall, is coordinated through International House and the Office of Residential Life. The group consists of both American and international students, and offers undergraduates the option of living in an International Component (with no specific area focus), a German Component, a Spanish Corridor, and a French Corridor. Students not actually living in the I.L.G. may become affiliated in order to participate in the various I.L.G. social and cultural activities.

The Office of Study Abroad is now located in International House; it coordinates both academic year and selected summer programs for Duke students abroad in var-

ious countries which include Austria, Canada, China, Egypt, England, Germany, India, Italy, Japan, and Spain.

The Office of Minority Affairs, Caroline L. Lattimore, Dean, 107 Union West. In 1972 the administration of Duke University established the Office of Black Affairs to meet the needs of black students. Six years later (1978), the name was changed to the Office of Minority Affairs (OMA). This office is an interdisciplinary/student service component of the University which attempts to assist minority students in their adjustment to student life. Its very existence suggests a commitment on behalf of Duke University towards implementation and centralization of services designed to address individual problems in our minority student population.

Within its organizational structure, OMA has five divisions: (a) the *administrative support staff* consists of undergraduate students who assist the Dean, the Assistant to the Dean, and the administrative secretary with clerical matters and general office operations; (b) the *counseling staff* is composed of graduate and/or professional students who offer peer counseling and advice to each minority undergraduate; (c) the *tutoring staff* is composed of undergraduate, graduate, and professional students who offer tutorial services in mathematics and chemistry; (d) the *research and development staff* conducts and offers statistical and historical research relevant to the programs, projects, and services of OMA; (e.) the *executive staff* consists of the Dean, the Assistant to the Dean, and the administrative secretary who organize and manage all OMA organizational and fiscal matters. Within the organizational structure of OMA, all staff members work to achieve the following objectives: to offer quality and humanistic counseling and advising for minority students; to advocate and promote improved race relations among the Duke University student body, faculty, and staff; to serve as a resource for student support services, faculty, and students on matters relating to minority students.

The major program components of OMA are: Counseling in Academic and Social Affairs (CASA), the Tutorial Program in Mathematics and Chemistry, the Summer Transitional Program (STP), and a proposed program for advising black graduate and professional students. In coordinating these diverse services, OMA provides a mechanism through which these programs function.

The CASA program for undergraduates was designed to function as a supportive agency emphasizing various social, personal, and academic concerns. While providing specialized counseling services for minority students, CASA's primary functions have been to reach those students who may be experiencing difficulty, to assist them, and/or to refer them to support services which may be beneficial to them. Additionally, CASA works closely with students who are progressing well in the University while serving as a channel of communication for minority students. The CASA staff offers counseling through outreach, referrals, and organized group activities. Individual counseling, group learning, guidance-related activities, and professional activities are areas of concentration in the counseling process. CASA also encourages its counselees to explore and test their interests and skills in a variety of academic and professional fields.

In conjunction with the Departments of Mathematics and Chemistry, OMA has initiated a tutoring program to facilitate higher achievement and improve the academic performance in these disciplines. The tutoring program offers individualized tutoring services for those students who need such assistance. Efforts are made to provide assistance as soon as possible through early identification. The tutoring program is free to all students who qualify for financial aid. The program also assists students in identifying tutors in other academic areas, if needed. Tutors meet weekly with the students and maintain continuous dialogue with CASA counselors, classroom instructors, University administrators, and University deans.

The Summer Transitional Program (STP) is designed to ease the precollege student's personal transition from high school to college. This multiracial program introduces students to academic and student life at Duke University. The value of STP lies in the fact that it is essentially structured around the needs of the students. The program offers seven weeks of concentrated academic experience in English 3-Composition, Mathematics 9, and Mathematics 19-Precalculus, and study skills. While simultaneously providing academic enrichment, STP through individual, group, and peer counseling provides supportive relationships to enhance the social growth of the participants.

The Dean of the Office of Minority Affairs is responsible for the management and direction of all OMA operations. These include a broad range of responsibilities such as budgetary and payroll matters, research projects, official correspondence, individual and group counseling, public relations, and policy making. The Assistant to the Dean of Minority Affairs assists in daily operations of the office and coordinates the CASA and tutorial programs. The Dean and Assistant to the Dean of OMA maintain continuous dialogue with the Freshmen Advising Center, the Academic Deans' staff, CAPS, the Office of Student Affairs, Student Activities, the Offices of Undergraduate Admissions and Financial Aid, the Religious Life staff, the Placement Office, and numerous student organizations. All students are encouraged to utilize the services of the Office of Minority Affairs. Individual and group conferences with OMA staff members may be scheduled daily.

Office of Placement Services, Patricia O'Connor, Director, 214 Page. The staff of the Office of Placement Services is the liaison between Duke students and potential employers. Students seeking part-time (including work/study), summer, permanent employment, or a career apprenticeship may consult the staff member who has the responsibility for each area. Members of the staff are available to help students plan a program which will provide a variety of employment opportunities in their career interest fields. A library of general and specific career information is available for students to use. The Office of Placement Services cooperates with other departments to plan seminars to give students an opportunity to talk with people in a variety of career fields, sponsors seminars on identifying career options, and offers sessions on interviewing and other techniques for finding employment.

The Office of Religious Activities, William H. Willimon, Minister to the University, Duke Chapel. The Minister to the University and a combined staff of twenty-two are responsible for providing a diversity of ministry which takes seriously Duke University as a pluralistic religious community. This broad ministry includes services of worship (both in Duke Chapel and in other locations in the University), programs of religion and the arts, and opportunities to develop caring and serving communities and to respond to critical social issues. Persons in the University are given an opportunity to help direct and shape this ministry and to participate in its many committees and programs. Chaplains and campus ministers are also available for individual counseling with students and others in the University community.

Office for Residential Life, Richard L. Cox, Dean, 209 Flowers. The Dean for Residential Life is concerned with the personal well-being of students and the development on the campus of a residential community supportive of a good educational experience. These concerns are addressed by the Dean and his staff through advising students regarding personal problems as well as assisting students to plan and present educational and cultural programs within the residence halls. Over one hundred Resident Advisers (RAs), who are staff members of the Office for Residential Life, reside in the residence halls and are directly responsible for the satisfactory administration of the student residences and their programs. They are also available

for counseling students and/or referring them to the various personnel services which provide specialized advice or counsel.

The Office of Student Activities, Homai McDowell, Director, 101-3 Bryan Center. The Office of Student Activities coordinates undergraduate group activities and advises both undergraduate and graduate clubs and organizations. The office serves as a liaison between the University administration and campus groups, clubs, and organizations. It is a clearinghouse for information on reserving rooms for film showings, meetings, and parties, as well as for information on obtaining services from other University departments.

The office offers workshops and other instructional and programmatic aids to promote the development of leadership and organizational skills within student groups, and to foster interaction among club officers. The Financial Manager assists club treasurers on a day-to-day basis and periodically provides instruction in bookkeeping, budgeting, and fund raising. This office provides a congenial atmosphere for club work, and makes available at no cost telephones, typewriters, table space, and advertising supplies. In addition, the office maintains a copy service for the convenience of student groups and organizations.

Opportunities for learning a variety of job skills are available under the office's internship program. Student interns have opportunities to either design or develop their own jobs, or to get hands-on experience in areas such as advising, leadership training, university administration, programming, public relations, auditing, and financial management.

The office also coordinates a variety of community service projects and serves as a liaison between the Duke community and the Volunteer Services Bureau of Durham.

Office of Student Life, Suzanne Wasiolek, Dean, 109 Flowers. The Dean for Student Life is responsible for advising individual students regarding personal or judicial problems. She also develops the orientation programs for freshmen and transfer students and serves as adviser to the Interfraternity and Panhellenic Councils. The coordination of the application of the general rules and regulations of the University and the files on student cocurricular honors, responsibilities, and membership are handled in her office.

The Assistant to the Dean for Student Life, Paul Bumbalough, works with all participants in the judicial process and coordinates the student advising system.

Dean Wasiolek and her assistant work with the Freshman Advisory Council (FAC), which is composed of upperclass men and women who are selected for qualities of responsibility and leadership. Members of the FAC are assigned to a small group of freshmen and, during orientation, they welcome their groups and help acquaint them with the University. The Office of Student Life also works with entering transfer students and the Transfer Committee, assists handicapped students, and coordinates the Student Health and Student Insurance policies.

The University Union, Jake Phelps, Director, Bryan University Center. The Bryan University Center, in the heart of the West Campus, is the hub of student, cultural, and service activities. It houses, among other groups, the University Union which brings students together in carrying out its stated purpose—to stimulate, promote, and develop the social, recreational, cultural, educational, and spiritual activities of the Duke University community. The Union sponsors a broad program including lectures, concerts, recreational activities, dances, and exhibits adapted to the leisure time interest and needs of individuals and diverse groups within the University and Durham communities. Also included under its auspices are services such as the Scheduling and Information Office and a copy facility; Student Locator Service; and creative opportunities such as the Craft Center, original film productions

and the campus' closed-circuit cablevision broadcasting system. While most of these activities are headquartered in the University Center, the Union programs are campus-wide.

Student Health Services

Student Health Program, Howard J. Eisenson, M.D., Director, Pickens Building. The goals of the Duke Student Health Program are to provide comprehensive high quality medical care, encourage students to make informed decisions leading to healthy life styles, and to act as a liaison when students need medical care not available at Student Health. To achieve these goals each student is assigned to a physician or physician extender who acts as their primary health care provider.

The components of the Student Health Program include:

1. Student Health Service, located in the Pickens Building.
2. The University Infirmary, located on East Campus.
3. The Health Education Program, headquartered in the Pickens Building, and operating campus-wide.

The Student Health Service at Pickens is open during both regular and summer sessions. The University Infirmary is open from the opening of the University in the fall until graduation day in the spring. All currently enrolled full-time students and part-time degree candidates are required to pay the student health fee. All fees are paid directly to the Bursar's office. Information regarding the fee is available at the Bursar's office.

The resources of the Duke University Medical Center are available to all Duke students and their spouses and children. Charges for any and all services received from the Medical Center are the responsibility of the student as are the charges for services received from physicians not associated with Duke University.

Policy Regarding Medical Excuses. The Duke University Student Health Service provides no written medical excuses. The student with an illness requiring infirmary care is permitted to postpone academic obligations arising during the infirmary stay. Such an individual is expected to make their own arrangement for later completion of any missed academic responsibility. Faculty members may verify the fact that a student visited the Health Service by calling the Student Health Clinic, 684-6721 or is confined to the infirmary by calling the University Infirmary, 684-3367.

Confidentiality attached to the University student's health record is carefully maintained. Release of any health information requires prior permission of the student involved. Such a policy is strictly enforced irrespective of the requesting source (e.g., University official, parents, family of the student, governmental authorities, physicians not immediately involved in care of the students).

IMPORTANT TELEPHONE NUMBERS.

24-hour Student Health Service number; 684-6721
University Infirmary: 684-3367

For Emergency Transportation (University Public Health Service): day or night
On campus: Campus Police, 684-2444
Off campus: Durham Ambulance Service, Durham telephone, 477-7341

STUDENT HEALTH SERVICE HOURS

At Student Health Service, Pickens Building (by appointment)	
Monday-Friday	8:00 A.M.-6:30 P.M.
Saturday	10:00 A.M.-1:30 P.M.
Sunday	2:00 P.M.-4:30 P.M.

FOR EMERGENCY PROBLEMS (when Student Health Service is not open)

Call University Infirmary, 684-3367

SERVICES PROVIDED BY THE STUDENT HEALTH CENTER

1. Unlimited outpatient visits to the Student Health Service.
2. Routine laboratory and x-ray examinations performed in the Student Health Service to diagnose acute illness or injury.
3. Hospitalization in the University Infirmary for treatment of acute illness or injury as authorized by the Student Health Service physician. The only infirmary charges are for board/exact costs. Method of payment will be explained to the student at the time of his/her admission. Hospitalization in Duke or other hospitals must be covered through private insurance policies or the Duke Student Accident and Sickness Insurance Policy.
4. Consultations with specialists in the Duke Medical Center required for diagnosis and treatment of acute illness or injury will be arranged. Such consultations are the student's financial responsibility. Financial coverage for these consultations may be covered by the student's private insurance policy or by the Duke Student Accident and Sickness Insurance Policy.
5. Certain periodic health examinations, such as for practice teaching, scholarships, and education programs can be obtained without charge and by appointment with Student Health Service physicians. Other examinations, such as for regular employment, travel abroad, marriage, and insurance, can be arranged, but will be provided at the student's expense. Students are urged to discuss their routine physical examination requirements with the Health Service personnel in order to prevent possible misunderstanding. (NOTE: Required health examinations for medical, nursing, and physician associates students are provided by the Health Service at the student's expense).
6. Immunizations required for the general protection of the student body will be provided free of charge. Immunizations required for other reasons (travel abroad, employment, etc.) can be arranged at cost. Clarification on this point can be obtained at the Health Service.
7. Regular injections, as in the treatment of allergic conditions, can be scheduled through the Health Service Clinic. There is a charge for this service payable at the beginning of each semester.
8. Medical management of gynecological and sexually transmitted problems will be provided by the Student Health Clinic. Women students who have paid the student health fee will be eligible to receive an annual gynecological examination including the Pap smear without charge. Annual examinations are done by appointment only by calling 684-6721. The cost of contraceptive supplies such as diaphragms, IUDs, birth control pills, contraceptive creams and foams, as well as cryosurgery for chronic gynecological problems are not covered by Student Health but are the student's personal financial responsibility. Referrals or consultations can be arranged as needed to the Department of Gynecology at Duke University Medical Center or to gynecologists in Durham as desired. Payment for such referrals is the responsibility of the student.
9. Outpatient treatment for emotional problems is available through the Counseling and Psychological Services Office.

SERVICES NOT PROVIDED BY THE STUDENT HEALTH CENTER

1. Routine eye examinations, lens prescriptions, or care of contact lens problems. (Treatment for acute eye disease or injury is provided).
2. Routine dental care. (Emergency treatment for infection or pain is provided on a limited basis).

3. Treatment of preexisting or chronic conditions. Such treatment as may be performed for these conditions by the Student Health physicians can be provided; however, referral for special studies or to consultants will be at the student's expense.
4. Private physician's fees. Students always have the option of employing private physicians of their own choosing; indeed, students with known and preexisting medical problems are encouraged to do so. Financial responsibility in such instances, however, rests with the students.
5. Treatment of injury and illness occurring between semesters is not covered.
6. Care of dependents or conditions relating to pregnancy.
7. Long-term psychiatric care. Acute psychiatric care requiring hospitalization is the student's financial responsibility though it may be covered by the student's private health insurance or the Duke Student Accident and Sickness Insurance Policy.

It should be emphasized that students requiring health services not provided through the Health Service can obtain information at the Health Service as to how such services can be most easily obtained.

THE DUKE STUDENT ACCIDENT AND SICKNESS POLICY

The Duke Student Accident and Sickness Policy is provided by the National Student Services, Inc. in association with Hill, Chesson and Roach, Durham, North Carolina. The insurance policy provides coverage for hospitalization, major medical expenses, certain surgical services and limited treatment and diagnosis on an outpatient basis. There are also provisions available for coverage for the student's spouse and dependent children.

Participation in some supplemental health insurance program is strongly suggested for students. All full-time and part-time degree candidates are required to enroll in the Student Accident and Sickness Policy unless they sign a waiver that they are covered by other comparable insurance or accept responsibility for all medical expenses. The policy number and name of the insurance is required on the waiver.

Detailed information regarding this insurance coverage is available in the Office of the Student Health Service and the Dean for Student Life's office. Any student with a concern about Student Health Services may contact Dr. Morris or refer to the grievance procedure in Appendix H.

Department of Housing Management.

Fidelia Thomason, Director, 018 West Union. The Department of Housing Management, a Business and Finance Division auxiliary, is responsible for residence hall and apartment facilities on East, West, Central, and North Campuses. The department has responsibility for the following services: physical maintenance of the residential buildings with work performed by the Physical Plant Department in the residence halls and Housing Management in the apartments, custodial care of the residential facilities, key issue and control (rooms and buildings), storage of personal effects, and control of furniture and equipment. Housing Management is also responsible for academic year and summer assignments in Central Campus Apartments and for summer session assignments in the resident halls. Business matters related to residential fees and rents come under the purview of the department. Residence hall and apartment business matters should be discussed with the Housing Administration office, 016 West Union Building. Questions about a student's apartment and facility service needs should be discussed with the residential area service office: 101R House D, 684-5486, for residents of main West Campus except Few; House VOO, 684-5559, for residents of Few and Edens; Hanes House desk, 684-5394, for residents of

Hanes, Hanes Annex, and Trent; Gilbert-Addoms desk, 684-5320, for residents of East Campus; and 217 Anderson Street, 684-5813, for residents of Central Campus.

Office of Alumni Affairs

Laney Funderburk, Director, 614 Chapel Drive. The Alumni Affairs Office initiates and sponsors a variety of activities and services linking Duke students with one of the University's best resources—its alumni. The freshman class directory, one of the most closely read booklets freshmen receive, is sponsored by the General Alumni Association and is compiled by Alumni Affairs. Homecoming Weekend in the fall, one of the traditional alumni-student activities, is another undertaking of the Alumni Affairs Office. A staff person has the responsibility to serve in an active role in all student-related activities, and this person works closely with Student Alumni Relations Committee (SARC), which is involved in organizing and supervising three separate subcommittees: the Alumni Summer Opportunities Program, the Duke Network, and the Conference on Career Choices. These programs are designed to strengthen student-alumni relationships and increase student involvement generally. Many get-togethers are planned for new and current students both on and off the campus. A member of the alumni staff serves as associate with the senior, junior, and sophomore classes to assist their officers with class activities and projects.

Academic Information



Miscellaneous Academic Policies and Procedures

PROCEDURE FOR RESOLUTION OF STUDENTS' ACADEMIC CONCERNS

Trinity College of Arts and Sciences provides formal educational opportunities for its students under the assumption that successful transmission and accumulation of knowledge and intellectual understanding depend on the mutual efforts of teachers and students. Ideally, the college offers a range of learning experiences in which students strive to learn enough to be able to test their ideas against those of the faculty, and faculty, through the preparation of course materials and the freshness of view of their students, discover nuances in their disciplines.

Sometimes, however, student-faculty interrelationships in certain courses give rise to concerns that, for whatever reason, can inhibit successful teaching and learning. When this occurs students often need assistance in resolving the issues.

The faculty and administration of Trinity College of Arts and Sciences attempt to be genuinely responsive to all such matters and a student should not hesitate to seek assistance from faculty and administrative officers in resolving problems.

Questions about course content, an instructor's methods of presentation, the level of discourse, criteria for evaluation of students, or about grades or administrative procedures in a course, should be directed to the instructor of the course. If a student believes that productive discussion with the instructor is not possible, courtesy requires that the instructor be informed before the student refers questions about the course to the Director of Undergraduate Studies or, in his or her absence, to the Chairman of the department. If a student's concern involves a departmental policy rather than an individual course, the student should first confer with the Director of Undergraduate Studies in the department. A list of the names, addresses, and telephone numbers of the various Directors of Undergraduate Studies can be found in the University Directory. Staff members in the department offices can assist in arranging appointments with the Directors. When necessary, Directors of Undergraduate Studies may refer students to the department Chairman.

A student in doubt about how to proceed in discussing a particular problem, or who seeks resolution of a problem, is encouraged to confer with an academic dean of Trinity College.

In those exceptional cases where a problem remains unresolved through informal discussion, a formal procedure of appeal to the Associate Dean and Dean of Trinity College of Arts and Sciences is available. A student may initiate this more formal appeal procedure by bringing his or her problem—with assurance of confidentiality, if requested—to the attention of the Associate Dean of Trinity College of Arts

and Sciences, who will request information about the nature of the issue and about the earlier efforts made to deal with it. The Dean of Trinity College will be informed about the situation.

Statement on Sexual Harassment of Students

Definition. Sexual harassment in an academic environment is understood to be the intentional misuses of authority by a faculty member by conduct focusing on the sexuality of a student in the teacher-student context.

Examples. Sexual harassment can take a variety of forms, from verbal suggestion or innuendo and repeated physical overtures of an overt physical nature, to requests for sexual activity accompanied by implied or overt threats of inducements concerning a student's grades, recommendations, academic progress, or professional standing.

Policy. Sexual harassment may be egregious or less serious; regardless of degree, it abuses the student-teacher relationship and has no place in the academic community. Appropriate sanctions will be imposed. Sexual harassment may rise to the level of misconduct justifying dismissal.

Procedures.*

1. Students who believe that they have been sexually harassed should report the incident or incidents to the Dean of their college or school or to an officer designated by the Dean to receive such complaints.† A coded, confidential record will be kept of oral complaints, with the number of and nature of the complaints reported annually to the Provost for informational and research purposes only. Complaints must be in writing before any action may be taken against the faculty member complained of; however, the student's identity will not be released to the faculty member complained of without the student's authorization, as provided hereafter.

2. A written complaint, signed by the student, identifying the faculty member and the behaviors complained of, should be submitted to the appropriate Dean. The complaint should specify whether the student is willing to have his or her identity revealed to the faculty member, and if so, whether he or she wishes a hearing to be held on the matter.

3. If the complainant does not request a hearing, the Dean shall make sufficient investigation to determine whether reasonable grounds exist to believe the faculty member has engaged in sexual harassment. During the course of this investigation, the Dean shall meet with the faculty member to inform him or her of the complaint, keeping the name of the student confidential unless the student is willing to reveal his or her identity.

a. If the Dean determines that there is not reasonable cause to believe the faculty member engaged in sexual harassment, the student and the faculty member shall be so informed, no further action shall be taken on the complaint, and no record of the complaint shall appear in the faculty member's file. However, the student may request a hearing (in which case his or her identity must be revealed), and the matter would then proceed as provided in Section 4 below.

b. If the Dean determines there is reasonable cause to believe the faculty member engaged in sexual harassment, the Dean shall so inform the student but shall not inform the faculty member nor proceed further against him or her unless the student is willing to reveal his or her identity. If the student is willing to reveal his or her identity, the faculty member shall be informed of the Dean's determi-

*These procedures are currently under review and subject to change.

†In Trinity College of Arts and Sciences: for men—Dean Albert Eldridge, 107 Allen, 684-2115; for women—Dean Virginia Bryan, 113 Allen, 684-6536.

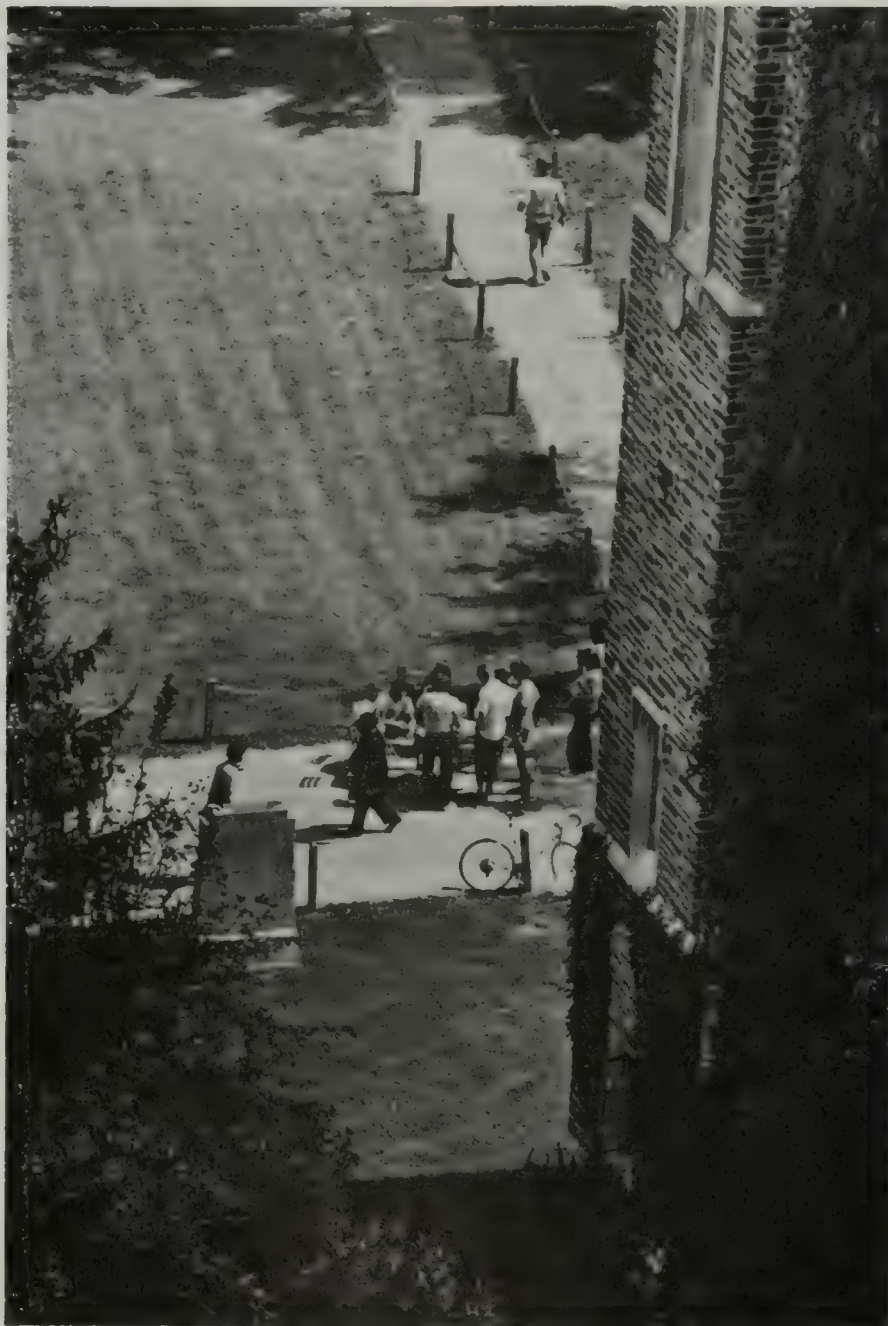
nation in a letter. Such letter shall specify any corrective action proposed to be taken and shall inform the faculty member of his or her right to a hearing. If the faculty member does not request a hearing, the letter shall become a part of the faculty member's file and the specified corrective action shall be taken.

4. If the complainant or the faculty member requests a hearing, a hearing shall be held to determine whether the faculty member engaged in sexual harassment.

a. The hearing shall be held before the Provost or his/her designate, who shall determine the procedures to be followed. If the Provost finds that no sexual harassment occurred, no action shall be taken against the faculty member and no record of the complaint shall appear in his/her file. If the Provost finds that sexual harassment occurred, he/she will so inform the parties and determine any corrective action to be taken. The decision of the Provost may be appealed, by either the student or the faculty member, to the President or, if the President delegates, to the Chancellor.

b. If the corrective action determined by the Provost is dismissal, a further hearing shall be conducted in accordance with the procedures for cases involving faculty dismissal (Faculty Handbook, Appendix E, Section V).

Residential Information



Residential Facilities

TRINITY COLLEGE OF ARTS AND SCIENCES THE SCHOOL OF ENGINEERING

Within the framework of the regulations of the community, individual students are responsible for their own decisions and choices. The Colleges adhere to the premise that social regulations and activities of the various living groups must be supportive of the general welfare of the total University community and must be protective of the interests of individuals and minority viewpoints within each living group. Most of these regulations are enforced by the members of the community. In addition to the social regulations formulated by each living group within the guidelines established by the Residential Life Committee, there are certain policies specified by the University that apply to students living within the residence halls in the interest of the safety and security of students and the orderly functioning of the dormitories. Any student or group of students may recommend a change in the regulations by presenting a proposal to the Residential Policy Committee, an advisory committee on matters of housing to the Dean for Residential Life. The residential facilities of Trinity College and the School of Engineering are available to all full-time single undergraduate students who have been in continuous residence since their freshman year as well as to students on leaves of absence or off campus provided they have filed the appropriate papers by established deadlines to the Housing Coordinator in the Office of Residential Life. Duke University residential facilities include residence halls and Central Campus Apartments. No undergraduate student may live in the residence halls for more than four years. Students who enroll in graduate or professional programs prior to receiving the undergraduate degree (such as "three/two" programs) are no longer eligible for undergraduate housing.

Freshman Residence Halls. Freshmen reside in all-freshman houses, the majority of which are coed, clustered on three of the four residential areas. The housing assignments are made by lottery to the houses; however, consideration is given to a student's preference for single sex housing. Within the residence halls, single, double, and triple rooms are available.

Upperclass Residence Halls. Upperclass students live in coed and single-sex residence halls on East and West Campuses. There are three types of living groups: independent or lottery, selective, and commitment. The independent living groups have their spaces filled by a general housing lottery. The selective living groups, which include the fraternities, select their members. The commitment houses select a third

of their new members from among the students who have made application to the house and the other two-thirds are lotteried from among the remaining applicants. Within all of the upperclass houses, except those located in Edens, there are triple as well as single and double rooms.

Central Campus Apartments. Located on Central Campus is a complex of University owned and operated apartments which accommodate over 600 undergraduate students. The remainder of the complex houses a cross-section of students from various schools and colleges of the University. This facility is part of the undergraduate lottery space, and assignment to this space satisfies the University's guarantee to provide eight semesters of housing.

Residential Regulations

(See also Student Life Section for additional information.)

In its residential policies and procedures, Duke University seeks to foster a climate of responsibility, initiative, and creativity on the part of individuals and living groups. A successful residential community is one in which students take pride in their physical surroundings and assume active responsibility for the maintenance of acceptable standards of public behavior in their living areas.

While students are indeed entitled to a general expectation of privacy within the confines of their own individual rooms (although, of course, extraordinary and compelling circumstances may occasionally require that this expectation be suspended), the University emphatically refuses to regard either students' immediate living quarters or their commons areas as privileged sanctuaries where students may act with absolute impunity and without regard to minimum standards of civility, decency, and respect for the rights of other members of the University community. Moreover, occupancy of an individual room or of a residence hall does not confer any proprietary interest or right of ownership on the part of the living group as a whole. The student and the living group are both properly viewed not as *owners* but as *custodians* of that living space (with all of its physical amenities) which has been assigned to them. And inherent in this custodial relationship, of course, is the right of the University to promulgate criteria governing the circumstances under which this relationship may be entered into, may be maintained in good standing, or may be terminated.

House Closing in Residence Halls with Security Systems. Houses are locked by 12:00 A.M. or at an earlier time agreed to by the house membership. Each student must obtain an entrance card key for his/her house from the Service Office in his/her area. A deposit is required. The deposit is refunded if the entrance card key is returned within 48 hours after the student vacates the building. Entrance card keys are not to be loaned or borrowed.

Signing Out. There is no requirement that a student leave a record of his or her whereabouts if he or she leaves the Duke campus. However, in order that students can be located when needed in an emergency and in the interest of students' safety, it is recommended that students leave records of their whereabouts and anticipated time of return with the residential staff or with roommates when they are out of the residence hall.

Meetings in Residence Halls. Because living group facilities are limited and are there to serve all the house members, it is expected that they will not be used for gatherings or meetings unless approved by the House Council and the appropriate Resident Adviser.

Guests. Students may have overnight guests for reasonable periods of time subject to the specified residence hall visitation policies for each residential unit. However, continued use of a residence hall room by person or persons other than those to

whom the room is rented is prohibited. Overnight guests should not be entertained during examination periods. The Colleges reserve the right to ask a guest to leave if University policies and residence hall regulations are not obeyed or if complaints are received from members of the resident community. A student may not have guests over the objection of his/her roommate(s). Violation of any of these regulations could lead to nonresidents being charged with trespassing and residents (both guest and host) having their housing licenses revoked.

LIVING OFF-CAMPUS

Students above the freshman level who wish to live off-campus should file the appropriate forms with the Housing Coordinator.

If a student plans to live off campus and return to University housing at a later time, he/she *must* request that his/her housing deposit be held up to one calendar year, after which it would be refunded and the housing guarantee revoked. Such requests should be made by completing the appropriate form in the Office of the Student Housing Coordinator.

HOUSING LICENSE

Prior to occupancy of space in a University residence hall or Central Campus apartment, each student must sign a housing license. Licenses for the residence hall must be filed with the Housing Coordinator in the Office of Residential Life. Licenses for the Central Campus apartments must be filed with the manager in the Housing Administration office. Refer to the appendices for copies of the terms of the residence hall license and the Central Campus housing license.

REGULATIONS AND JUDICIAL BOARDS FOR RESIDENTIAL UNITS

As provided under the judicial structure of the University, each residential unit may have a judicial board which has jurisdiction over most offenses involving violations of regulations relating to dormitory procedures and social regulations. Information about residential judicial structures and procedures common to the undergraduate community appears in Appendix E.

PRIVACY OF STUDENT'S ROOMS AND APARTMENTS

Students who reside in University residences are assured the privacy of their rooms and apartments and freedom from the admission into or search of their rooms or apartments by any unauthorized persons; however, the University is obligated to maintain reasonable surveillance of the residential areas to promote an environment consistent with the aims of an academic community. To foster these conditions the following regulations are now in effect.

1. Housing Management and custodial personnel may enter assigned rooms or apartments at reasonable hours on days designated by either bulletin board notices or similar prior notification for the purpose of carrying out their assigned tasks and functions. Other personnel may enter assigned rooms when accompanied by proper authorization from the appropriate administrative official (see section 2 c). In the case of residence halls this notification, when feasible, shall be posted on the residence hall bulletin board stating what dates rooms will be entered. Maintenance personnel may enter assigned rooms or apartments at reasonable hours for the purpose of carrying out their assigned tasks and functions. Housing Management personnel are expected to inspect the maintenance work done within twelve (12) working days to validate satisfactory completion of such work. Employees in the above categories may report on the condition of University facilities and equipment, on violations of the housing license, or on situations which jeopardize the overall health and safety of the

residence hall population. All personnel in the above category shall leave written notice stating the purpose for entering. Upon receipt of this notice the occupant may contact the area Service Manager office to discuss the entry. The written notices must, as well, advise the occupant that subsequent investigation or repair may henceforth occur at any time during the normal work week of Housing Management or maintenance personnel. (Note: General rule or enforcement procedures will not be founded on information relating to the personal contents of rooms from personnel mentioned unless such contents are specifically prohibited by University regulations or by the housing license published in advance.)

2. No person, with the exception of those listed in section 1 above, shall enter assigned rooms or apartments except under the following conditions:

- a. consent of the occupant(s); or
- b. presentation of a properly drawn legal search warrant; or
- c. presentation of a written authorization from the Dean for Residential Life, the Dean for Student Life, or their representatives, as appropriate; or
- d. emergency situations or immediate threat to preservation of the building and the safety of occupant(s) and/or the residential population.

3. Reports made as a result of inspections related to physical facilities and/or furnishings will be handled by the Department of Housing Management in accordance with the existing residential regulations as published in bulletin form by the University.

4. Written authorization from the deans must specify the reasons for believing such a search is necessary, the objects sought, and the area to be searched.

5. The request for a search, if approved by the designated authorities, shall be kept in records with the authorization until the time of the student's graduation and shall be available to the student for examination. The records will be kept completely separate from the student's permanent record. Should the search figure in any trial proceeding within the University, the authorization shall be attached to the trial record; if no action is taken following an authorized search, notation of this fact shall be filed with the authorization. No action shall be taken in regards to objects found but not specified on the authorization of the search.

In the absence of a legally drawn search warrant, no general searches shall be conducted by University personnel except with the possession of the written authorization of all these above-mentioned deans, stating the reasons for the search and the specified objects sought, or under circumstances deemed to be of extreme emergency by these deans or the officer on each campus in charge of maintenance.

CARE OF RESIDENCE HALL ROOMS AND ADJACENT CAMPUS AREAS

Though limited custodial services for common use areas are available, a student is responsible for the care of his or her room and furnishings and is required, as a condition of occupancy, to keep the room reasonably clean and orderly. The University reserves the right for Housing Management, as well as custodial maintenance personnel, to enter at reasonable hours to inspect the condition of any student's room in accordance with the current privacy policy.

Nails, screws, tacks, or adhesives on the plastered walls or woodwork of the residence are prohibited. The utilities, wiring, locks, or screens should not be altered in any way. No student may remove University furniture or equipment from his or her room nor alter furnishings in any way.

Furniture, including water beds and pianos, may not be brought into residence hall rooms.

Games and other activities which may damage lawns or shrubbery adjacent to residence halls are not permitted. Defacing or painting buildings and adjacent installations, sidewalks, trees, and shrubbery is prohibited.

No student shall enter custodial, utility, or maintenance spaces within the residence halls unless accompanied by University-authorized custodial or maintenance personnel. Use of roof areas is prohibited.

Complaints and requests pertaining to maintenance and services should be reported to the Service Office in the appropriate residential area.

The housekeeping personnel is expected to clean all public areas of the residence halls. However, if students have left such areas in an unclean condition beyond that expected by normal use, housekeeping personnel will not clean the area until noon of the work day on which the condition is discovered to give the students a period to clean the area. After this period, should the area remain uncleaned, the residence unit will be billed for the additional clean-up. When an unclean condition presents a safety or health hazard, clean-up may be done before noon. Clean-up is still at the group's expense.

Any living group charged with a four hour or longer clean-up by Housing Management will be sent a warning letter by Residential Life. If a group receives a second four hour or longer charge in the same semester, that group will come before the Residential Judicial Board for adjudication. A group's record will be cleared at the end of the fall semester unless it has appeared before the Residential Judicial Board because of the clean-up policy. All records will be cleared at the end of the academic year.

All living groups are responsible for cleaning trash beyond the normal amount on the grounds adjacent to their residence halls. Failure to have the area cleaned before 10 A.M. the day after an event will result in a minimum charge of \$25 to be determined by the Physical Plant office; however, the enforcement procedure indicated in the above paragraph is also applicable to failure to clean grounds adjacent to the residence halls.

Extra trash containers are available from the Physical Plant office by calling 684-3611 at least two days prior to the event.

Damage Charges. Students will be held responsible for damages that occur in their rooms. Living groups similarly will be charged for damage to public areas, equipment and furnishings, buildings, sidewalks, shrubbery, and lawns; repair costs will be billed to the students in accordance with procedures established by the University after consultation with the Residential Policy Committee. At the end of each academic year, outstanding living group charges will be divided equally among the group's members and charged to their Bursar's accounts. Littering which causes excess work to clean will be charged to the students and living groups involved. Appeals for reassignment of costs charged by Housing Management should be made through the residential area Service Manager. If further appeal is deemed necessary, the final decision on appeals is made by the Residential Judicial Board.

Storage. During the academic year, all empty trunks and luggage may be stored without charge in the area designated for each residence hall. All items placed in storage for the academic year must be removed prior to the last day of final examinations for the spring semester. Storage rooms will be announced before and after recess periods. Nonstudents and students residing off-campus may not store personal effects at any time in the residence hall storage rooms. Items placed in storage must be well marked with owner's name and permanent mailing address. Receipts given at time of acceptance must be surrendered by the student on withdrawal of storage items. Items left in storage rooms at the end of the spring term for which summer storage fees have not been paid will be disposed of in the best interest of the University.

The Department of Housing Management provides space for storage of personal or group-owned items during the summer months on a fee paid basis and in approved areas only. Any personal effects or group-owned items left in the residence halls not in approved storage areas (including, but not limited to, commons rooms, closets,

and above suspended ceilings) may be disposed of without notice or reimbursement to the owner. Designated closets have been made available to some living groups for storage of group-owned items such as file cabinets, party supplies, and fraternal material. These closets may not be used by members of the living groups for storage of personal possessions. Housing Management is not liable for damage to or loss of stored living group items except as the fee paid storage terms allow.

RESIDENCE HALL BENCH POLICY

Only approved living groups may place benches on University property. Benches will be permitted only in the area immediately adjacent to a particular residence unit. The bench may be put in place by the living group as long as the dimensions are no larger than 12' in length, and 5' in height from the ground, and 6' in depth. Any benches cemented in the ground which need to be moved for any reason will be cut off at ground level and not replaced in concrete by the University. Any bench too large to move in one piece will be separated into manageable pieces and reassembled using existing lumber without reimbursement to the living group for damages. Every effort will be made to retain the integrity of each bench when it is necessary to move a bench; however, the University will not be responsible for replacing concrete footings or materials damaged as a result of a move. Living group benches may have to be moved temporarily (e.g., for Commencement or summer programming). The specific design and desired location of a living group's bench must be submitted in writing to the Dean for Residential Life three weeks prior to the desired construction date. Approval for a bench must be received from the Dean for Residential Life and the University Architect.

LIVING GROUP BUILDING IMPROVEMENTS AND RENOVATIONS POLICY

Any alterations and/or renovations to residence halls must be approved by the Director of Housing Management.

Any living groups wishing to make permanent or attached alterations, additions, or renovations to residence halls must submit plans, drawings, and other related information to the Director of Housing Management for evaluation.

If approved, such alterations, additions, or renovations will be accomplished at the living group's expense. Housing Management will inspect the completed work to make sure approved materials and plans were used and that the quality of construction is acceptable. Any construction which does not pass inspection must be removed or corrected as directed by Housing Management and at the living group's expense.

Anything attached to the building will become the property of and maintained by Duke University. No reimbursement will be considered if the group is subsequently moved.

Any changes of a permanent or attached nature not approved through official channels may be removed at the convenience of the University and subsequent repairs made at the group's expense.

Any nonattached additions a living group wishes to make to the public areas of its residential hall (e.g., extra furniture, art work, portable bars) need not be submitted to the Director of Housing Management for approval so long as the items are truly portable. However, the living group should understand that Housing Management may require the group to remove (or may remove at the group's expense) any item which may damage the facility, hinder maintenance of the facility, or present a health or safety hazard. Groups should also understand that Housing Management may find it necessary to remove their additions during the summer in order to accommodate summer users or maintenance projects. In such cases, Housing Management will take every precaution not to damage the item and to return it in tact. However, should the item be damaged or lost, no reimbursement will be made to the group.

Living groups are encouraged to seek their Service Manager's advice when considering nonattached additions.

EXTERIOR SIGN POLICY FOR RESIDENCE HALLS

Exterior building signs identifying living groups will be permitted only in the immediate area of the residence. The sign must be provided by the group and approved jointly by the Director of Housing Management, the Dean for Residential Life, and the University architect.

All such signs will be mounted on the buildings by Housing Management at no cost to the group. Requests for sign approval and mounting should be made in writing to the Director of Housing Management.

BAR POLICY FOR RESIDENCE HALLS

See also "Living Group Building Improvements and Renovations Policy."

1. No permanently attached bars will be allowed in living groups (after 1981). Bars built in University facilities which are affixed in any way to the building or which are too heavy to be moved will be destroyed at the University's convenience and at the expense of the living group, including necessary repairs to the facility.

2. Only movable (not attached to floor or building) bars will be allowed. The bar should be able to be removed from the building without damage to the bar or to the building.

3. Any group being moved to a location where a serviceable bar is located will not be reimbursed for their current bar which must remain in place.

4. Groups moving to a new location who are unable to move current bar (built prior to 1981) will be reimbursed in order to build a movable bar. Plans and sketches for a bar which a living group wants to construct should be forwarded to the Dean for Residential Life for approval. Plans should be submitted at least two weeks prior to the date intended for initiating the project.

DECORATIONS IN RESIDENCE HALLS

Any living group or individuals planning a party in the residence halls which has as decorations such potential fire hazards as paper draping, hay, bamboo, etc., must obtain clearance for the use of decorations from the Safety Manager of the Duke Public Safety Office (684-5909). Approval from the Safety Office does not relieve a living group of its responsibility for prompt clean-up or of its financial responsibility for damages (including any excess cleaning required by Housing Management).

POLICY FOR REFUND OF RESIDENTIAL DEPOSITS, RENT PREPAYMENT, BOARD PAYMENTS, AND RENTS FOR RESIDENCE HALL STUDENTS

Residential Deposits. The one hundred dollar (\$100) residential deposit paid upon matriculation to Duke will be refunded if the Office of Residential Life is notified by the student prior to July 1 of his or her intent to move out of residence hall housing for the fall semester and by December 1 if cancelling for the spring semester.

Fall Rent Prepayment. The fifty dollar (\$50) rent prepayment will be refunded if the Office of Residential Life is notified by the student prior to the last day of spring semester classes of his or her intent to move out of residence hall housing.

Move from Residence Halls to Central Campus Apartments. Students who move from the residence halls to Central Campus Apartments will have their room rent payment credited to the Central Campus Apartment rent and will receive full refund of unused board payment (unused points) if the board contract is terminated at the time of the residence hall cancellation. Students also have the option of maintaining or changing the board contract at this time.

Cancelling a Residence Hall Assignment. Undergraduate students who have been assigned a room who wish to cancel their assignment must notify the Office of Residential Life in writing. Students who cancel their assignments after the contract has begun will be entitled to a refund of the unused rent, the amount to be determined by the date of written notification to the Office of Residential Life or the date of vacating the residence halls, whichever is later. In any case a minimum of \$50 will be retained by the Department of Housing Management. Refunds of unused board payment (unused points) will be given if the board contract is terminated at the time of room cancellation.

HOUSE DUES POLICY

Duke University has a strong commitment to a residential community supportive of a good educational experience. The activities of each residential house which contribute to this experience are possible only through a financial commitment of the members of that house. Therefore, students living within a residential hall are obliged to pay the dues upon which the residents agree. (It should be noted that the University has taken this obligation into account when determining a student's financial aid package.)

1. It is required that house dues be agreed upon by at least a two-thirds majority vote of the living group membership in a well-announced meeting attended by at least three-fifths of the members or through a poll of all residents. Further, it is understood that this is a private matter between the individual and his/her living group. Each living group is required to set dues to a \$20 per person minimum for each semester.

2. Students in living groups which are part of a federation assume the responsibility for paying federation dues in addition to house dues. Treasurers of houses which are part of federations are expected to collect the federation dues from members of their living groups and submit the total amount due to the federation at a time mutually agreed upon by the living groups and their federation.

3. Students who move from one living group to another can expect a prorated refund from their former living group and are expected to pay prorated house dues to the new living group.

4. Students who have accepted membership in a particular living group in which they continue to reside and, at a later time, accept membership in another group shall be obligated to pay dues to both groups unless a written agreement is negotiated with the groups involved.

5. Independents involuntarily placed in fraternity sections or fraternity men involuntarily placed in independent sections are not obligated to pay house dues. They may choose to pay social dues if invited to do so by the fraternity or the independent house; however, they are obligated to pay a small annual fee (usually \$15 or less) if they use the commons room and television and must help with normal expenses due to damage in common areas.

6. Should a selective living group be unable to fill its assigned space with its members, up to 10 percent of the space (with approval of the Office of Residential Life) may be allocated to "affiliate" members who have a contractual financial arrangement with the selective group. Such persons have full social privileges within the selective group and are often referred to as "friends of the house."

ASSISTANCE FOR LIVING GROUPS IN COLLECTING DUES

The Office of Residential Life will assist in collecting dues *only* if house treasurers submit to that office a list of those delinquent in payment by September 30 for first semester dues and February 3 for second semester dues along with a statement indicating that portion of dues which is used to buy alcohol (the Office of Residential

Life will not assist in the collection of living group dues which is used to purchase alcohol). Also, in order to have the assistance of that office in collecting dues, house treasurers *must* be audited by the Student Affairs Financial Manager at least once during each semester, preferably at the end of each semester.

Appeals. Every house must make available to all students the option of appealing in-house for a waiver of dues. Although some groups prefer to have such appeals heard by the House Judicial Board, it is recommended that appeals be heard in a closed meeting of the appellant and the House Treasurer (and, perhaps, House President) with the Resident Adviser as observer and adviser. The contents and decision of such appeals are to be held in the strictest confidence. When a waiver is granted, it may be assumed unless otherwise specified in the decision, that the appellant retains all social privileges in the house. The hearing panel may recommend full payment, installment payment, or nonpayment. Decisions of the hearing panel may be appealed to the Residential Judicial Board whose decision is final and binding.

N.B.: Joining a fraternity or a sorority, participating in other organizations, taking no interest in activities of the living group, or deciding to spend one's discretionary funds in another way do not constitute valid grounds for exemption from paying dues.

Sanctions. Graduating seniors failing to pay living group dues which have been properly established will be referred to the Residential Judicial Board for adjudication. Other students failing to pay living group dues which have been properly established must move to another location (a) determined by the Office of Residential Life at the end of the fall semester or (b) determined by the general lottery at the end of the spring semester for the following fall term, whichever is appropriate. If entering the lottery in the spring, such students will be grouped behind all other students entered into the lottery.

VIOLATIONS OF HOUSING LICENSE

All terms of the housing license are designed to protect the health and safety of students and to provide for the comfort and privacy of students who have contracted to occupy University housing. Any conduct which reflects a serious disregard for the rights, health, security, and safety of other occupants of University housing will be reason for revocation of this license and/or disciplinary actions. See Appendix A for copies of the residence hall and Central Campus licenses.

Annual Review of Residential Groups

The following statement of residential group standards and annual review is based on one initially drawn up by the Residential Life Committee to provide a mechanism for the continued improvement and support of the Duke upperclass living groups. The goal of this annual review is to support groups that have satisfactory residential programs and to aid groups which have deficiencies in improving their programs.

The specific terms of this program are as follows:

1. By the last day of class in the spring semester, each upperclass living group must file in the Office of the Dean for Residential Life the following information:
 - a. a constitution of the governmental structure of the group
 - b. a statement of the goals, standards, and proposed contributions to the residential program
 - c. a list of activities through which its members attempted to accomplish its stated goals in the current year
 - d. an outline of proposed activities for the following year
2. Early in the the fall semester, the upperclass and fraternity program advisers will meet individually with each living group president to go over the Annual Review

Report which was submitted for their living group the previous spring. The purpose of these meetings is twofold: (a) to advise and inform the new house councils concerning the prior year's successes and failures in their living group's programming, and (b) to introduce student leaders to the programs, funds, facilities and services which the Residential Life Office offers them in their programming efforts.

3. Early in the fall semester, the Dean for Residential Life will submit each living group's Annual Review Report to a special committee which the Dean will convene initially and which will be composed of the following:

- a. an ex officio representative of the Office of the Dean for Residential Life who will chair the group
- b. the President of ASDU or a representative
- c. the President of IFC or a representative
- d. the President of UHA or a representative
- e. the Chairperson of the Residential Judicial Board or a representative
- f. two faculty members appointed by the Dean for Residential Life, one each from Trinity College and the School of Engineering
- g. an academic dean appointed by the Dean of Trinity College

This committee will review and evaluate the program of each living group, examining in particular the following:

- a. attainment of stated goals
- b. quality of group's program
- c. disciplinary record
- d. academic and intellectual atmosphere.

The committee will then submit the results of its evaluation to the Dean for Residential Life. On the basis of the committee's recommendations, and subject to his approval, the Dean for Residential Life will send letters to each living group president informing him/her whether the group's program was determined to be outstanding, satisfactory, or in need of improvement.

4. After all living groups have received letters notifying them of the results of their review, the committee will meet with the President and one other officer of each of those living groups whose programs were determined to have been in need of improvement. The purpose of this meeting is to offer suggestions for correcting deficiencies in the overall program of the living group. They will be called before the committee again in the spring semester to report on the progress of the living group. If at the spring review a living group continues, in the judgment of the committee, to have an unsatisfactory program, the committee may recommend to the Dean that the living group be placed on probation for a given period of time, during which time the living group will be expected to correct the program deficiencies identified by the committee. At the end of the period of probation, the living group must appear before the committee for review. If the program is again judged to be unsatisfactory, then the committee will refer the matter to the appropriate person for further action (see "Responsibilities of Residential Groups" below).

Responsibilities of Residential Groups at Duke University

(See also "Annual Review of Resident Groups.")

Living groups are responsible for maintaining the standards and adhering to the regulations established by Duke University and adjudicated by the various judicial boards. If such standards and regulations are violated, a living group may be dissolved. The final decision regarding the continuation of a living group rests solely with Duke University.

Living groups may be placed on the status of "warning" by the Offices of the Dean for Residential Life or the Dean for Student Life because of behavior problems which are not considered to be serious enough for judicial action. Living groups which

fail to correct the problems which caused the group to be placed on the status of "warning" or as a result of an infraction of University regulations more serious than what would normally result in a warning may be sent to the appropriate judicial board which may recommend to the appropriate dean that a living group be placed on "probation." The status of probation shall be imposed for a period of not longer than two semesters.

Living groups may be placed on "interim suspension" by the Offices of the Dean for Residential Life or the Dean for Student Life and the matter forwarded to the appropriate judicial board for violation of the status of probation, for serious infractions of University regulations, for repetitive failure to submit required information to the University, for continued behavioral problems, or for continued failure to meet financial obligations. The appropriate judicial board then may recommend to the appropriate dean that a living group be placed on suspension. Any judicial body on its own initiative may also recommend suspension of a living group to the appropriate dean. It shall be the decision of the Dean as to whether a living group is placed on suspension and that decision may be appealed to the Vice-President for Student Affairs. The Vice-President's decision shall be final and binding. During any period of suspension or interim suspension, the suspension shall be for a period of no less than two weeks.

A living group alleged to be in violation of the terms of a suspension or alleged to have committed a violation of University regulations deemed serious enough by the Dean for Residential Life or the Dean for Student Life to so warrant will have a special dissolution hearing conducted by the Office of the Dean for Residential Life. In addition, no living group will be placed on suspension for consecutive semesters; a living group committing an offense that might otherwise be cause for suspension during the semester following a suspension will also have a special dissolution hearing conducted by the Office of the Dean for Residential Life. The dissolution hearing panel shall be composed of three representatives from the Division of Student Affairs, the President of the IFC, the Panhellenic Council, or AIH as appropriate, and a faculty member. The panel shall report its recommendation to the Dean for Residential Life. It shall be the decision of the Dean as to whether a living group is dissolved and that decision may be appealed to the Vice-President for Student Affairs. *The Vice-President's decision shall be final and binding.*

Housing Policies for Selective Living Groups and Their Members

The following housing policies for selective living groups are gathered together from the February 26, 1981 Report of the Student Affairs Trustee Committee in response to the Residential Life Section of *Directions for Progress*; "Social Fraternal Organizations Policies and Procedures, Duke University, July 1, 1979;" and "Residential Life: Policies and Procedures for Undergraduate Students, 1984-85."

Duke University is under no obligation to supply housing to any fraternity or sorority at the time of installation on the campus. While the Dean for Residential Life will consider the requests for housing from recognized fraternities or sororities, the University is under no time constraints to provide such housing.

In accordance with the guidelines adopted by the trustees in 1981, there is to be no greater number of fraternity living groups chartered. Furthermore, there is a 50 percent ceiling on the number of upperclass bed spaces on campus allocated to men and women's selective living groups (the number of selective bed spaces for men would be no more than 50 percent of the upperclass men's spaces on campus and would depend upon the percentage of fraternity men).

POLICIES REGARDING SPACE ALLOCATED TO AND FILLED BY FRATERNITY LIVING GROUPS

1. All fraternities are expected to fill 100 percent of their sections' bed spaces with initiated members of the fraternity ("brothers"). N.B.: Only initiated brothers count toward fulfillment of this housing obligation; "friends of the house" (see 2b. below) and pledges do not count toward fulfillment of this obligation.

2. If a fraternity fails to fill 100 percent of its section's bed space with initiated members, but does fill 90 percent or more of its bed space with initiated members, the following rules apply:

a. the Office of Residential Life may elect to use any open spaces to house fraternity men from other fraternities;

b. if the Office of Residential Life does not elect to house fraternity men of its choosing to fill the unoccupied spaces, the fraternity may fill its unoccupied spaces with "friends of the house;" i.e., independent men who, upon mutual agreement with the fraternity, choose to live in the fraternity section, pay the dues required of them by the fraternity, and have social privileges within that selected group.

3. If a fraternity fails to fill 90 percent of its section's bed space with initiated members of the fraternity, the following rules and procedures apply:

a. the Office of Residential Life may, at its discretion, convene hearings to review:

i. the fraternity's continued presence in its current section and the question of relocation to a smaller section;

ii. the fraternity's continued presence in any University housing and the question of placing the fraternity in nonresidential status; or

iii. the fraternity's continued recognition as a living group and the question of revocation of the fraternity's charter.

4. Should the number of members exceed the space in the allocated section, the excess members (to be determined by the living group) would find it necessary to be assigned space in another fraternity section which has available space, to move to proportionately allocated Central Campus Apartment space, or to move off campus.

5. Rooms in selective houses that are identified by the Office of Residential Life as being large enough to be expanded from singles to doubles or doubles to triples may be so expanded upon election by the selective group or by institutional need as may be determined by the University.

6. Each selective living group is required to submit to the Housing Coordinator in the Office of Residential Life before November 15 (for spring semester) and February 15 (for fall semester) a list of eligible initiated members who will be living in the section for the following members who will be living in the section for the following semester.

POLICIES REGARDING WHERE MEMBERS OF FRATERNITY LIVING GROUPS MAY RESIDE

1. Members of a fraternity living group may reside only in the section of residence halls allocated to their group unless the number of members exceeds the space.

2. Any members unable to live in their section because their living groups have more members than beds, must either be assigned space in another fraternity with available space, must move off campus, or move to Central Campus Apartments if space is available there after all lottery assignments are completed. Those students moving off campus have the option of retaining their residential status if they arrange with the Housing Coordinator in the Office of Residential Life to have their housing deposits held for reinstatement in housing when space within the living group becomes available.

POLICIES REGARDING SPACE ALLOCATED TO AND FILLED BY NONFRATERNAL SELECTIVE LIVING GROUPS

1. All nonfraternal selective living groups are expected to fill 100 percent of their sections' bed spaces with members whom they select.
2. If the group fails to fill 100 percent of its section's bed spaces with members, the Office of Residential Life may, at its discretion, use the open spaces to house other students.
3. If the group fails to fill 90 percent of its section's beds spaces with members:
 - a. the Office of Residential Life may, at its discretion, permanently reallocate any or all empty spaces to other students
 - b. the Office of Residential Life may, at its discretion, convene hearings to review:
 - i. the living group's continued presence in its current section and the question of relocation to a smaller section;
 - ii. the question of whether or not to change the selective living group to nonselective status by which students are then assigned to the section by the Office of Residential Life.
4. Rooms in selective houses that are identified by the Office of Residential Life as being large enough to be expanded from singles to doubles or doubles to triples may be so expanded upon election by the selective group or by institutional need as may be determined by the University.
5. Each selective living group is required to submit to the Housing Coordinator in the Office of Residential Life before November 15 (for spring semester) and February 15 (for fall semester) a list of eligible members who will be living in the section the following semester.

Student Life



Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his/her willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the University.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University, and, by delegation, with administrative officers of the University and of the schools and college. In the undergraduate college and schools, as well as in the University as a whole, many of these rules have been established over the years by cooperative action between students and administrative officers, and in the case of some rules, with participation of faculty members as well. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated academic and nonacademic conduct; and these proposals have been accepted by colleges and University officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke.

Similarly, the enforcement of rules in the undergraduate schools and college has traditionally been a cooperative endeavor of students and administrative officers, as well as faculty members who have participated in review and appeals committees and have advised with college and University officers about appropriate standards and procedures in such matters. The judicial structure of the University consists of a University Judicial Board, a Judicial Board for each of the communities within the University, and a Judicial Board for the residential units.

The judicial structure formalizes the tradition of shared participation by various members of the University and college community. Its viability, however, is dependent upon a mutual recognition by all members of the community of the need for high standards of scholarship and conduct, a willingness to exercise the personal and corporate responsibilities that accompany such recognition, and an appreciation of the different roles and responsibilities played by various members who participate in the life of the community. This last factor relates particularly to the role of students in determining and supporting high standards.

If you have any questions concerning University regulations, the judicial structure or procedure, contact Vice-President William J. Griffith (684-3737), 106 Flowers, Dean Sue Wasiolek (684-6488), 109 Flowers; or Dean Richard Cox (684-6313), 209 Flowers.

The Undergraduate Community

Students in Trinity College and the School of Engineering constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and certain University regulations are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the board and the procedural safeguards and rights of appeal guaranteed to students are set forth in Appendix C. Also provided is an alternative procedure for hearing certain cases by the Dean for Student Life alone or by that officer's appointee as well as an appeal procedure. The judicial code which follows was drafted and approved by the Judicial Review Committee during the spring semester, 1980 and amended during the spring semesters, 1982 and 1983.

THE JUDICIAL CODE OF THE UNDERGRADUATE COMMUNITY

Paramountcy of State and National Law. On November 21, 1852, the General Assembly of North Carolina amended an act to incorporate Union Institute in order to create a Board of Trustees in perpetuity for Normal College then located in Randolph County. The amended act provided that the trustees could grant degrees and "do all other things for an institution of learning not inconsistent with the laws of this State and of the United States." The act was subsequently amended in 1859 to permit a change in the institution's name to Trinity College and again in 1924 when Duke University was established.

Since 1852 the Trustees of Duke University and their predecessors have been legally empowered to act "not inconsistent with the laws of this State and of the United States." Thus, to this date all officers of Duke University and those to whom their powers may be formally delegated are bound by laws of North Carolina and those of the United States.

The University is not an island. Students, faculty, administrators, and Trustees alike are subject to state and federal laws. Acceptance of admission to any of the undergraduate schools or colleges of this University carries with it the assumption of a sense of responsibility for the welfare of the community. Also assumed are obligations on the part of each individual to respect the rights of others, to protect the University as a forum for the free expression of ideas, and to obey the laws of the state and nation.

Acts in violation of North Carolina and United States law are necessarily in violation of the Undergraduate Judicial Code. Such acts when committed on University premises are within the cognizance of the Undergraduate Judicial Board unless otherwise expected. When committed off the University premises they may fall within the board's jurisdiction if constituting a direct or indirect threat to the University community whether or not the offense results in action by a regular civil or criminal court.

Proceedings under the Judicial Code of the Undergraduate Community before, during, or after any which may occur in the regular state or federal courts do not subject a student to "double jeopardy" because such jeopardy arises only in criminal law proceedings. Governments alone, not the University, enforce the criminal law. Action by the board or other University agencies enforce the terms under which a student has accepted admission to Duke University and all sanctions imposed relate to a student's status at the University.

Although the laws of North Carolina and the United States are incorporated in the Judicial Code, enumerated below are common infractions lying within the juris-

diction of the Undergraduate and Residential Judicial Boards. Conduct in violation of the code is punishable by sanctions contained in Appendix C, Art. IV (K) and Appendix E, Art. III of this bulletin.

I. Academic Dishonesty

A. Plagiarism: Expropriation of words, phrases, or ideas of another without attribution for the benefit of one who engages in the act of expropriation. (See "Use and Acknowledgement of Sources" in this bulletin.)

B. Cheating:

1. Obtaining access, without the instructor's permission, to an examination question or questions prior to the instructor's distribution of the examination.
2. Copying or attempting to copy during an examination from another's work in progress or completed, handwritten, typed, or published without consent of the instructor.
3. Without the instructor's permission, collaborating with another, knowingly assisting another or knowingly receiving the assistance of another in writing an examination or in satisfying any other course requirement(s).
4. Committing fraud on a record, report, paper, examination, or other course requirement to be submitted to or in the possession of an instructor.
5. Submission of multiple copies of the same or nearly similar papers without prior approval of the several instructors involved.
6. In the satisfaction of any course requirement, failure to adhere to an instructor's specific directions with respect to the terms of academic integrity or academic honesty for that course requirement.

II. Assault and/or Battery

- A. Battery: Any use of physical force against a person without his or her consent.
- B. Assault: Any threat of the immediate use of any degree of unauthorized physical force or an attempt to use such force which threatens or actual attempt gives rise to a reasonable apprehension of force against the person threatened as perceived by that person. (See also "University Regulations and Policies: Hazing" in this bulletin.)

III. Taking, Converting, and Selling

- *A. Theft: Any wrongful physical taking and carrying away of the personal property of another without the rightful owner's consent with an intention to deprive the owner of its use.
- †B. Larceny: Any wrongful physical taking and carrying away of the personal property of another without the rightful owner's consent and with an intention to convert it to the use of the taker and into the taker's own property or to convert it to the use of and ownership of a third party.
- C. Embezzlement: Fraudulent conversion of another's personal property by one to whom the owner trusted it.
- D. Fencing: Knowingly receiving or concealing stolen property.

*1983 revision of substance.

†1983 revision of form.

IV. Property Damage: Willful and malicious damage to real or personal property owned by others including that owned by Duke University, especially fire equipment, as well as that owned by members of the University community and by visitors to the University. (See "University Regulations and Policies: Fire Equipment" in this bulletin and "Care of Dormitory Rooms and Adjacent Campus Areas.")

V. Breaking and/or Entry

- A. Breaking: Any bodily action or attempt by means of such bodily action intended to create an opening for access to real or personal property without consent of the owner of such property.
- B. Entry: Any physical bodily presence within real or personal property without consent of the owner. Such illegal entry includes trespass on unauthorized areas. (See "University Regulations and Policies: Roof and Ledge Areas, Unauthorized Access.")

VI. Disorderly Conduct

- A. Any willful act, committed without justification or excuse, that unreasonably disrupts the normal public use of public areas, or that substantially disturbs the peace and order of the University community. (See "University Regulations and Policies: Alcoholic Beverages" and "Noise.")
- B. Any grossly unreasonable and reckless conduct in the handling of things or substances ordinarily regarded as inherently dangerous or capable of becoming dangerous to other persons or to their real or personal property.

VII. Fraud

- A. Any intentional misrepresentation of fact in an attempt to induce another to surrender a right or property or to authorize the conferring of a benefit in reliance upon the misrepresentation.
- B. Forgery or alteration of documents, including course examinations, papers, or other required exercises, in an attempt to obtain a right or benefit or property.
- C. Obtaining a right or benefit or property under false pretenses.
- D. Unauthorized misuse of otherwise valid documents.

VIII. Bribery: Corruption of another for personal gain.

IX. Attempt: Devising or arranging means or measures necessary for commission of a prohibited act or an overt step undertaken to commit a prohibited act.

X. Contempt

- A. Failure to comply with direction, orders, or commands of any University judicial or police authority, or any academic or administrative official of the University acting in an official capacity. (See "University Regulations and Policies: Library Control Desk Inspections" in this bulletin.)
- B. Knowingly furnishing false information to any such authority or official of the University acting in an official capacity.

XI. Illegal Possession: Any transporting to or storing on the campus or possession of firearms, weapons, explosives, or fireworks. (See "University Regulations and Policies: Fireworks, Other Explosives and Weapons" in this bulletin.)



University Regulations and Policies



Students should be familiar with the Judicial Code of the undergraduate community and with the following regulations and policies of the University. Violations are matters which are subject to adjudication before the Undergraduate Judicial Board.

ALCOHOLIC BEVERAGES

North Carolina State Law Regarding the Sale, Possession, and Consumption of Alcoholic Beverages. Summary of North Carolina State Regulations (Reference: North Carolina General Statute, paragraph 18B-101.)

Section 18V-302 of North Carolina Law
Sale to or Purchase by Underage Persons

1. Sale
 - A. It is against the law to sell or give beer or wine to anyone under 19 years of age.
 - B. It is against the law to sell or give liquor or mixed beverages to anyone less than 21 years old.
2. Purchase or Possession
 - A. It is against the law for a person less than 19 years old to purchase or possess beer or wine.
 - B. It is against the law for a person less than 21 years old to purchase or possess liquor or mixed beverages.
3. Aider and Abettor
 - A. Any person underage who aids or abets another in violation of the above regulations shall be guilty of a misdemeanor, punishable by a fine up to \$500 or imprisonment for up to six months.
 - B. Any person over lawful age who aids and abets another in violation of the above regulations shall be guilty of a misdemeanor, punishable by a fine up to \$2,000 or imprisonment for up to two years.
4. Conviction Report sent to Division of Motor Vehicles. Underaged persons convicted of purchasing or attempting to purchase alcoholic beverages shall automatically have their drivers license revoked for a period of one year.

DUKE UNIVERSITY REGULATIONS REGARDING SALE, POSSESSION, AND CONSUMPTION OF ALCOHOLIC BEVERAGES.

In addition to the N.C. state law regarding the sale, possession, and consumption of alcoholic beverages, Duke has the following regulations:

- A. If beer, wine, or other alcoholic beverages are served at any event sponsored by a University club, organization, department or residence hall, it is the re-

sponsibility of the sponsoring group to insure that no underage person is served by carding all participants. Groups may hire Duke Public Safety officers or designate monitors from within their organizations for the purposes of carding participants.

- B. The University prohibits the consumption of beer, wine, or other alcoholic beverages in the public areas of the freshman residential buildings. Kegs are not allowed in any area of the freshman residential buildings.
- C. The University prohibits the distribution of liquor or mixed alcoholic beverages at the registered parties in or adjacent to upperclass residence halls. See Party Registration Policy.
- D. The University prohibits the consumption of beer, wine, or other alcoholic beverages on the University's grounds or in its nonresidential buildings, with the following exceptions:
 - 1. Beer and wine may be consumed in specially designated areas, such as the West Campus Union or Bryan Center, at registered private functions which are held in accordance with University regulations. Beer and unfortified (table) wine may also be sold by Duke University to students of lawful age and consumed at places licensed for such sale.
 - 2. Beer and unfortified wine may be consumed in areas immediately adjacent to residential buildings. State law, however, prohibits the consumption of alcoholic beverages on private property "in view of the general public." The Dean for Student Life shall be empowered to designate the specific areas which shall be considered "immediately adjacent" to residential buildings.
 - 3. Beer and unfortified wine may be consumed at specific locations on the athletic fields only in the context of special functions sponsored by official living groups, departments, or recognized student organizations, provided that prior approval is obtained from the Office of the Dean for Student Life.

Alcoholic beverages may not be consumed on any athletic field in conjunction with an athletic event.

- 4. Beer and unfortified wine may be consumed in or immediately adjacent to specially designated nonresidential buildings in the context of special functions sponsored by official living groups or recognized student organizations provided that prior approval is obtained from the Office of the Dean for Student Life. The Dean for Student Life shall be empowered to designate the specific areas which shall be considered "immediately adjacent" to these buildings.
 - 5. Beer, wine and other alcoholic beverages may be consumed in (and beer and unfortified wine may be consumed immediately adjacent to) specially designated nonresidential buildings in the context of special functions sponsored by departments provided that prior approval is obtained from the Office of the Dean for Student Life. The Dean for Student Life shall be empowered to designate the specific areas which shall be considered "immediately adjacent" to these buildings.
- E. If beer, wine, or other alcoholic beverages are served at a University-sponsored event sponsored by a University club, organization, or department, a nonalcoholic beverage besides water must also be served in the same manner. The quantity of the nonalcoholic beverage must be sufficient to equal the demand for the nonalcoholic beverage.
- F. If beer or wine is served at an event sponsored by a residence hall, a nonalcoholic beverage besides water must also be served in the same manner. The quantity of the nonalcoholic beverage must be sufficient to equal that demand

for the nonalcoholic beverage. Nonalcoholic beverages must also be provided free of charge if the alcoholic beverages are provided free of charge.

- G. Living groups remain responsible for the general tone of their residential unit, and they may by majority vote adopt house regulations more limiting than the laws of the state and the regulations of the University.

PARTY AND/OR EVENT REGISTRATION

1. Rationale for Registration of Parties or Events

The registration of parties or events is intended as a mechanism to allow the University community to prohibit illegal and inappropriate behavior on the part of the citizens of the community, to insure that the sponsoring organization and/or individual(s) is (are) informed of all regulations pertaining to the use of alcohol, and to encourage the acknowledgment and assumption of the responsibility which is involved with the use of alcohol.

All residential and social groups are responsible for designating a member to participate in an Alcohol Awareness Session at the beginning of each academic year. This representative must recognize that he/she is responsible for disseminating current information concerning the use of alcohol and the existing state and University regulations concerning its use to the members of his/her organization.

2. Registration procedure

A party or event must be registered if any of the following occur:

- a. scheduling of nonresidential facilities: i.e., Von Canon Hall, Card Gym., quads, etc.
- b. participants include individuals other than dues paying members of the sponsoring organization and one guest per member
- c. sound amplification equipment is placed or directed outside (stereo speakers, live bands, etc.)
- d. alcohol is sold
- e. party or event is advertised
- f. "beer trucks" from local distributors are desired in certain areas of the campus.

The required registration forms may be obtained in the Office for Student Life, 109 Flowers, and must be completed and returned to the office 72 hours prior to the event. If a group is uncertain about the need to register, they should not hesitate to call 684-6488 for information.

Violation of the party registration procedure or failure to conform to the specified limits for a party or event as defined above shall result in suspension of a group's social activities for at least two weeks. This suspension period shall be doubled for each subsequent violation.

Alleged violations of state and University alcohol regulations shall be subject to adjudication by the Alcohol Hearing Committee.

HEARING PROCEDURE

- A. In the event that an individual or group is alleged to be in violation of the North Carolina state law or the University alcohol regulations, a hearing committee shall be authorized to adjudicate the allegation. Such a hearing committee shall be composed of a representative from each of the following organizations or offices:

1. Associated Students of Duke University (ASDU)
2. Association of Independent Houses (AIH)
3. Interfraternity Council (IFC)
4. Panhellenic Council (Panhel)
5. Student Life

6. Residential Life

- B. The hearing committee members will elect a chairperson and the Office of Student Life will be responsible for the necessary paper work and the calling into session of the committee.
- C. An individual or group alleged to be in violation of University or state alcohol regulations has the right to request an administrative hearing conducted by a representative each from the Office of Residential Life and Student Life. The administrative representatives may refuse to hear the case and remand it to a hearing committee.

The hearing committee or the administrative representatives may decide that a case is beyond their jurisdiction and thus remand the case to a more appropriate judicial body.

D. Appeals

Decisions of the hearing committee are final unless appealed to the Vice-President for Student Affairs within one week (seven days) of the written decision. Grounds for appeal are limited to:

- 1. Verdict not supported by the weight of the evidence
- 2. Excessive penalty not in accord with "current University community standards"
- 3. New evidence of a character directly affecting the verdict, but on which the original tribunal has refused a hearing
- 4. Error in applying or interpreting the rule under which the case was originally tried

E. Sanctions

- 1. Suspension of group social activities
- 2. Fines. All revenue from fines will be directed to the Residential Programmatic Fund
- 3. Group social probation
- 4. Volunteer service for the Duke/Durham community
- 5. Written reprimand
- 6. Required or recommended meeting with the Health Educator or another appropriate University official

PARTY PROMOTION

By choosing to serve beverages containing alcohol as part of a social function, you and your group or organization assumes certain responsibilities beyond direct University regulation.

Test cases involving common law precedents and the dispensation of alcohol beverages are changing the definition of who is liable for a drinker's actions to include the general category of "social hosts." A social host may be a fraternity, a residence hall organization, a private citizen, or any combination of the preceeding.

For example, serving alcohol to a minor who subsequently breaks his leg could render an individual or group liable for the minor's medical bills. Serving an individual who is "already" or "obviously" drunk and who subsequently has an automobile accident could render an individual or group liable for the injury or death of third party victims of the accident, or any property damage resulting from the accidents.

In general, CREATING OR PROMOTING ANY SET OF CIRCUMSTANCES WHICH ENCOURAGE ANY OF YOUR GUESTS TO CONSUME ALCOHOL TO THE POINT OF INTOXICATION CAN HAVE FAR REACHING NEGATIVE CONSEQUENCES OF A MOST SEVERE NATURE.

Legal proof of negligence in the dispensation of alcohol usually involves the consideration of wide variety of factors, including the manner in which hosts promote social functions where alcohol is served.

In addition to the responsible monitoring of the social event itself, IT IS IMPERATIVE THAT YOU AND YOUR GROUP OR ORGANIZATION DO NOT PROMOTE YOUR EVENT IN SUCH A MANNER THAT A POTENTIAL GUEST MIGHT REASONABLY BELIEVE YOUR SOCIAL EVENT IS AN INVITATION TO BECOME INTOXICATED.

SPECIFICALLY: FLYERS, BANNERS, AND SIGNS WHICH ADVERTISE SOCIAL EVENTS WHERE ALCOHOL WILL BE SERVED MUST NOT OVERTLY OR COVERTLY STATE OR IMPLY AN INVITATION TO PARTICIPATE IN EXCESSIVE DRINKING.

CAMPUS BANNER POLICY

Requests for hanging banners on University buildings must be jointly approved by the Office of Residential Life, Housing Management, and the Physical Plant Office. If approved, a banner may be hung for a period of not more than three days. The banner must be removed by the sponsoring organization within 24 hours of the event that it advertises. (In the event that there is no date for the banner, then a three day maximum will be established for its display. If the group fails to remove the banner within the designated time, the University will remove it at a cost to the responsible organization or individuals. Where no sponsoring organization or individual may be identified, banners will be taken down immediately.

CONFERENCES AND CONVENTIONS

Invitations to individuals or to organizations outside the University to hold conferences or conventions on campus must be discussed with and approved by the Dean for Student Life well in advance of the extension of the invitation by the prospective host or host group at Duke. It is the established policy of the University not to use its dormitory facilities for the housing of convention guests during the academic year. The University does, however, reserve the right to use dormitory rooms for special guests during announced vacations.

DISCRIMINATION, APPEAL PROCEDURE FOR STUDENTS EMPLOYMENT

Complaints from students of discrimination regarding hiring practices should be filed in writing with the Office of Placement Services, 214 Flowers Building. A staff representative of the Office of Placement Services shall notify the University Equal Opportunity Office in writing of the complaint within ten (10) working days. The Equal Opportunity Office will investigate the complaint, notify the Office of Student Affairs and the respective college or school of the student, and attempt to reconcile the parties. Should the complainant feel that the complaint of discrimination has not been remedied after receiving a written evaluation from the Equal Opportunity Office, appeal may be made to the respective dean of the student's college or school.

DOGS ON CAMPUS

All dogs found running loose on campus or tied to an obstacle with the dog unattended by the owner will be removed from the campus to the Durham County Dog Pound by a county official. Upon claiming the dog the owner will be required to furnish identification. The Department of Public Safety will refer the names of such students to the appropriate dean; employees will be referred to their department head. Other persons who indicate an unwillingness to cooperate with Duke University regulations in this matter will be given trespass warnings.

DRUGS

Duke University prohibits its members to possess, use, or distribute illegal drugs, including opiates, barbiturates, amphetamines, marijuana, and hallucinogens, except for legally authorized possession and distribution of drugs of the classes specified. In addition, the presence and use of many of these drugs within the University community are contrary to the intellectual and educational purposes for which the University exists.

The University recognizes that ignorance or innocence concerning such drugs threatens the safety of members of its community. It therefore seeks to provide as much information as it can concerning the consequences of harmful drugs. The University recognizes also that the illicit use of drugs may reflect emotional problems and is prepared to assist its members involved in their use through medical and psychiatric counseling. Nevertheless, the University considers a violation of the drug prohibition a serious matter and reserves the right to take action appropriate to the circumstances of each case.

Action taken by the University in all cases of drug violation will be guided by a concern both for the emotional and physical welfare of the person involved and for the maintenance of a suitable educational environment for all members of the University. See Appendix F for rules governing drug violations.

FIRE EQUIPMENT

In an effort to provide adequate protection, fire extinguishers are located in all residence halls. Since the installation of this equipment, numerous fires have been quickly controlled, avoiding injury or loss of life. The potential impact of having fire extinguishers vandalized or stolen is clear; yet, each year individuals continue to disregard the safety and rights of others by destroying and tampering with this equipment.

Damage and/or theft of fire equipment is punishable under North Carolina General Statute 14-260 which carries a maximum penalty of six months imprisonment and/or \$500 fine. In addition, students who have allegedly misused or vandalized fire equipment may be referred to the Undergraduate Judicial Board. Judgements rendered by this board may result in the loss of housing privileges and/or other punishment.

It is University policy that dormitories be billed for theft and/or vandalism of fire extinguishers within the residence halls.

To further assure life safety, fire alarm systems are located in each residence hall at convenient locations to alert the occupants in case of fire. Turning in false alarms may result in unnecessary deployment of fire vehicles and the penalties for turning in false alarms or tampering with the alarm system are the same as those listed above.

FIREWORKS, OTHER EXPLOSIVES, AND WEAPONS

The General Statutes of North Carolina strictly prohibit the possession of firearms, explosives, and weapons on any university campus. Students are not permitted to bring to the campus or store on the campus any weapon, including any gun, rifle, pistol, explosive, switch-blade, knife, or dagger. Students may not possess fireworks of any kind.

HAZING

Duke University considers hazing to be a serious infraction of University regulations. Hazing Policy: Any action taken or situation created, intentionally, whether on or off fraternity, sorority, or University premises, to include physical discomfort, embarrassment, harassment, or ridicule. Such activities and situations include but are

not limited to paddling in any form; creation of excessive fatigue; physical and psychological shocks; road trips, or any other such activities carried on, in or outside the confines of the University; wearing publicly apparel which is conspicuous and not normally in good taste; engaging in public stunts and buffoonery, morally degrading or humiliating games and activities which are not consistent with fraternal law, ritual, or policy or the regulations and policies of Duke University. (Modified from: Statement on Hazing, Fraternity Executive Association). Students should also be aware that hazing is a misdemeanor under North Carolina state law and is punishable by up to a \$500 fine and/or six months imprisonment. The action of even one member of the group may constitute hazing by the fraternity or sorority. Any fraternity or sorority convicted of hazing may be warned, placed on probation, or the charter of the group suspended for a period of time or permanently. Individuals responsible for hazing are also liable for action by the Undergraduate Judicial Board.

IDENTIFICATION CARDS

Undergraduate students are issued identification cards which they should carry at all times. The cards are the means of identification for library privileges, student health services, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards upon request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the Office of the Registrar, 103 Allen Building. The cost of a new ID card is \$5.

LIBRARY CONTROL DESK INSPECTIONS

In order to guarantee the orderly functioning of the Perkins Library for the benefit of all members of the University community, control desk attendants have been established at the library's principal exit and are authorized to examine all books and other library materials which persons leaving the building may be carrying in hands, briefcases, or bags to determine if they are properly charged. Anyone who refuses to permit his or her books to be examined may be denied further use of the library. Student offenders will be reported to the appropriate dean of the University, who is authorized to refer such offenders to judicial boards or to take independent disciplinary action, including penalties, up to and including suspension, appropriate to the seriousness of the offense.

LIBRARY POLICY CONCERNING FOOD, DRINK, AND TOBACCO IN PUBLIC AREAS.

This policy is meant to decrease:

- a. Damage to books and furnishings
- b. Infestation of the building and the collection by vermin
- c. Deterioration of a pleasant, studious environment
- d. Cost of housekeeping

The policy applies in *public areas* of the library to all people, including University staff, faculty, students, and other persons working in or using the library. Public areas include the several study rooms, seminar rooms, all carrels, elevators, hallways, restrooms, stairwells, and all book stacks. Also, this policy applies to everyone when walking through public areas of the library.

1. No smoking or other tobacco use is allowed except in designated areas. (These are: most restrooms, except where expressly prohibited; Graduate Reading Room smoking lounge; front lobby; the large Faculty/Staff Lounge, rooms 014, 220A, and 226, and the Breedlove Room.)

2. No food or drink is to be consumed except in designated areas. (These are: the Faculty/Staff Lounges, front lobby, Rooms 220A, 226, and the Breedlove Room.)
3. Food, drink, and tobacco will be subject to confiscation by library staff if used in undesignated areas.
4. Any food and drink brought through the library must be concealed; open containers are subject to confiscation by library staff.

MEDICAL CENTER, SMOKING AND PUBLIC TRAFFIC

Smoking is prohibited in the Medical Center, including the buildings of the School of Nursing, except in certain specified areas which are marked "Smoking Permitted." Smoking is prohibited in all other areas, including corridors, patient examination and treatment rooms, elevators, nursing stations, stairwells, laboratories, libraries, classrooms, and lecture halls.

If the hospital must be used as a shortcut between campus and Hanes House/Hanes Annex/Trent Hall/Pickens, *please be quiet, orderly, and mindful of the patients, their families, and the nature of a hospital environment.* Use the entrance closest to your point of business and do not linger or congregate. Due to patient activity in the clinic area, students are requested not to enter or exit through door #4, Baker House. Bicycles and sports equipment should not be brought through the hospital. As would be expected, shoes and shirts are required.

NOISE (DISORDERLY AND DESTRUCTIVE BEHAVIOR)

This policy has been developed after consultation with the Associated Students of Duke University, the Interfraternity Council, the Association of Independent Houses, the Residential Judicial Board and the Residential Policy Committee. This policy is based on the belief that all persons residing in the community have a responsibility to respect the rights, health, security, and safety of other community members and that persons who repeatedly fail to respect others should no longer be afforded the privilege of residing in University housing.

Disorderly and/or destructive behavior by students is prohibited.

1. Any student accused of destroying personal or University property is liable for judicial action before the Residential Judicial Board or before the Undergraduate Judicial Board, as appropriate.
2. Quiet hours will be in effect throughout the campus except during the hours of 5:00 P.M. to 1:00 A.M. on Friday, from 1:00 P.M. to 1:00 A.M. on Saturday, and from 1:00 P.M. to 6:00 P.M. on Sunday. Quiet hours are in effect twenty-four hours a day at Central Campus Apartments.
 - a. Violations of quiet hours will be adjudicated by the Residential Judicial Board.
 - b. Even during the hours listed above, students are expected to continue to respect the rights of others.
 - c. During quiet hours, students who are disturbed should attempt to resolve the situation by contacting the other parties involved; or, if needed, seek the assistance of house officers or Resident Advisers. In some areas of campus, an internal system for dealing with disturbances has been established by house officers (including distributing lists of house officers and RAs to contact) which has worked quite well. All quadrangle areas are encouraged to implement such a procedure. During the hours listed above, the Public Safety Officers and student monitors will continue to respond to complaints and will notify those creating a disturbance that a complaint has been made. However, complaints made during the time periods noted above when quiet hours are not in effect will not be

considered as violations of the policy unless extenuating circumstances are present such as noise interfering with classes which are in progress. If necessary, complaints may be registered by calling the Public Safety Office at 684-2444. Complainants should provide their name and location when calling the Public Safety Office. Such information will remain confidential. In cases going before the Residential Judicial Board, the Public Safety Incident Report will serve as the plaintiff. The chairman of the Residential Judicial Board (or designate) may contact the complainant to verify the incident and request additional information. If an anonymous complaint is made, the Residential Life Office will send a letter notifying the group or individuals that a complaint was made. If a group or individual receives two or more actionable noise complaints (where the complainants have been identified) and is found guilty by the Judicial Board, then all additional anonymous complaints will be made known to the board to assist in determining the sanction.

- d. The Public Safety Officer, RA, or House Officer will forward to the Dean for Residential Life a report of all noise complaints. In those cases where students have cooperated when contacted by the Public Safety Office, a letter will be forwarded to the students concerned or to the President of the living group informing them of the complaint. The students will also be informed that any further complaints during the remainder of the academic year will be forwarded to the Residential Judicial Board for adjudication.
- e. Should the Public Safety report indicate that the students had been warned and that the noises persisted and necessitated a return to the same student room or house in the same evening, then the report will be sent directly to the Residential Judicial Board for adjudication.
- f. Residential and quad parties are permitted provided that such parties have been approved under procedures as implemented through the Office of the Dean for Student Life.
- g. Under no circumstances during quiet hours may stereo speakers be placed or pointed outside. During nonquiet hours, an individual or living group may only place or point speakers outside for a function that has been approved by the Dean for Student Life.

It should be noted that residents are responsible for actions of their guests and that living groups as a whole may be held responsible for violations of this policy. The Residential Judicial Board when adjudicating a violation of the above policy will follow its established procedures and may impose the established sanctions including fines and/or eviction from the residence halls.

PAINTING POLICY

There has been a long-standing tradition of allowing student organizations and individuals to paint the East Campus bridge. Students are reminded that this activity may not extend beyond the bridge to include the painting of roads, sidewalks, telephone poles, lamp posts, trees, or any other University or municipal areas. Any groups or individuals identified as being responsible for painting anything other than the bridge will be charged for clean up and may also be subject to judicial action.

PARTIES IN RESIDENTIAL AREAS OUTSIDE OF RESIDENCE HALLS AND "BEER BLASTS"

See "Alcoholic Beverages" in this bulletin.

PICKETS, PROTESTS, AND DEMONSTRATIONS

See Appendix E.

POLICY ON USE OF SEGREGATED FACILITIES

It is University practice not to discriminate in any way on the basis of race, creed or national origin. This statement covers official activities sponsored, financed and controlled by University personnel and campus organizations, whether these activities are held on or off campus. If they are held off campus, they must not utilize facilities where discrimination is practiced. Naturally the University will not attempt to dictate to individual students, faculty members, or private groups how they should conduct their personal affairs outside the University.

The above policy applies to all social functions sponsored by undergraduate residence hall campus organizations. The failure of student groups to comply with this policy may result in suspension of their social privileges. Repeated offenses by campus organizations could result in the revocation of their charters.

POLICY FOR REGISTERING "THEME" PARTIES

Any theme party held in the residence halls which involves the introduction of "foreign materials" (such as hay, bamboo, paper draping, etc.) as party decorations must be approved by the Safety Office of the Duke Public Safety Department. Because such materials may prove to be fire hazards, it will be necessary to have clearance from the Director of the Safety Office.

ROOF AND LEDGE AREAS, UNAUTHORIZED ACCESS

The only authorized persons permitted on the roof and ledges of University buildings are maintenance personnel and certain other University officials. Students found in these areas will be referred for judicial action and/or may be subject to the immediate revocation of their housing license.

POLICY CONCERNING FILMS AT DUKE

Films—open to the public—are shown every evening of the academic year August 26–May 5, graduation. During the two summer sessions there are at least two evenings per week of film showings.

Presenters

A. Film Committee Presenters

The two major film committees responsible for carefully chosen film series are (1) the D.U.U. Freewater Film Series, presenting 16mm film (in multiple showings of two or three presentations each evening) on Tuesday, Thursday, and Friday in the Film Theater, Bryan University Center, and on certain occasions children's films on Saturday morning; and (2) Quadrangle Pictures (Quad Flicks)—the oldest film program on campus presenting 35mm films on each Saturday and Sunday (two showings each evening) in Page Auditorium.

Participation in these two committees is open to students, faculty, and staff. For Freewater Films, contact the program adviser or the chairperson of the D.U. Union, 101 Bryan University Center, ext. 2911. For Quadrangle Pictures, contact the Director of Cultural Affairs, 109 Page, ext. 5578. Both groups solicit the opinions of the student body and faculty in the selections of films and are most happy to cooperate whenever possible in bringing films requested by departments and organizations.

During the two summer sessions, Freewater shows films on Sunday evenings and Quadrangle Pictures on Wednesday evenings, both in the Film Theater, Bryan University Center.

B. General Campus Presenters

Monday and Wednesday evenings may be utilized by departmental groups, residential units, fraternities and sororities, and by organizations chartered by ASDU to have public showings of 16mm films in the Film Theater. If admission is charged, the sponsoring group must use the Film Theater of the Bryan University Center, for which appropriate tax payment has been made to the city. The presenters should be aware of and should adhere to the following regulations:

1. All film presentations must be sponsored by the above organizations with funds from admission sales going to the respective organizations.
2. No film showing may be presented for an individual's self-aggrandisement.
3. Permission is withheld from film presenters for the showing of x-rated films until justification for their presentation is reviewed. Other films which, regardless of rating, are shown or have been found to encourage disruptive behavior may be restricted.
4. All film presenters must employ the services of a house manager and a projectionist, both provided by the Building Manager, Bryan University Center (office adjacent to the bank machines on the intermediate level, 684-2656). These employees will be present throughout the entire presentation. An estimate of cost will be available from the building manager.
5. All public announcements for the film showings (such as flyers, posters, calendar, and *Chronicle* announcements) must be made to display clearly the sponsoring group's official name. Advertising for all film presentations is restricted to the campus media.

Film Sources. A complete up-to-date collection of film catalogues may be found in the Office of Cultural Affairs, 109 Page Building, and the D.U. Union Office, 101 Bryan University Center. The reference room of Perkins Library also has extensive files of film catalogues and other relevant reference material. The Durham County Library (on north Roxboro Street) also has projectors (movie and slide) for rent. You must have a library card to rent these. Catalogues may also be ordered directly from film companies.

Locations for Film Showings. The auditorium on the Duke campus authorized for film showings for which an admission is charged is the Film Theater of the Bryan University Center. This hall is covered by the payment of a privilege license tax paid by Duke University to the city of Durham and to the state of North Carolina. To charge admission to films shown in other areas is in violation of state law and brings into question the legal position of the University.

Free Films. If no admission is charged and no donation is received, films may be publicly shown in any appropriate room on campus, but their scheduling must adhere to other rules applicable to general campus film presenters to prevent conflicts.

Possible Film Restrictions

- A. X-Rated Films Policy—Permission is withheld from film presenters for the showing of x-rated films until justification for their presentation is made through appeal.

1. An appeal by the Freewater Film Society and by other organizations under the jurisdiction of the University Union will be reviewed by the board of the University Union whose decision will be communicated to the Vice-President for Student Affairs for final review.
 2. An appeal by other chartered organizations will be reviewed by the Vice-President of Student Affairs directly. All reviews and subsequent decisions will take into account, among other considerations, the objectives to be served by exhibiting the film, its educational value, and the extent to which the request can be supported by a social or aesthetic justification. When, in response to an appeal, permission is granted to present an x-rated film, the following procedures will be required: the Vice-President for Student Affairs will (a) decide whether or not the film in question shall be listed in the Duke University weekly *Calendar*, (b) designate what kind of identification may be required of members of the Duke University community and/or their guests, (c) decide whether or not a representative of the Public Safety Office may be required for the purposes of assisting the sponsoring group, at the latter's expense. In addition, those attending must show proof of age that complies with North Carolina state law.
- B. Other Film Restrictions—The decision to withhold the scheduling of films which, regardless of rating, are shown or have been found to encourage disruptive behavior may be made by:
1. The University Union board for films proposed by the Freewater Film Society and by other organizations under its jurisdiction.
 2. The Film Board of the Office of Cultural Affairs for films proposed by chartered organizations. The decision by either of these boards to withhold the scheduling of a film may be appealed to the Vice-President for Student Affairs. When in response to an appeal, a favorable decision is reached, the same procedures listed in (a) through (c) will be required.

Film Scheduling Procedures and Regulations.

1. A general meeting of film presenters will be announced by the scheduling office prior to final examinations for film presentations to be scheduled during the next semester. At this meeting a lottery for the selection of dates will be held.
2. After the general meeting of film presenters films may be scheduled between the hours of 9:00 A.M. and 4:00 P.M. on weekdays in 109 Page Building.
3. Film presenters may schedule only one film per semester unless other dates are available. In this event an additional film may be scheduled after October 1 for the fall semester and January 31 for the spring semester. Both must be approved by the Director of the Office of Cultural Affairs or designate.
4. No film may be shown that is already scheduled for the academic year until following the originally scheduled showing. If groups decide to show a film that is already scheduled, they may not publicly announce in any way their choice of film presentation until the initial group has shown the film.
5. No public film showing (those announced to the general University community) may take place on the same day and/or time where another film has been scheduled.
6. The Manager of the Bryan University Center has reserved the Film Theater for use on Monday and Wednesday evenings for film presentations.

The scheduling procedure starts at the Calendar Office, 109 Page Building. Pick up scheduling application (triplicate form in white, yellow, pink) and complete. Check the *University Calendar* for clear date to avoid conflicts. Select film and set starting times for multiple showings. All films must end by 12:30 A.M. to clear theater for closing before 1:00 A.M. Get signature of Director of Office of Cultural Affairs or designate to confirm date and film choice.

7. All chartered organizations' presenters should then proceed to the Office of Student Activities, located behind the Information Desk in the Bryan University Center. Pick up a review of bookkeeping procedures, get the account code of your organization and signature of the Director of the Office of Student Activities or designate. The Director of the Office of Student Activities or designate will not sign the scheduling application form until the following arrangements have been made: (a) the applicant organization's account has been reviewed to determine the ability of the organization to cover the film rental, film transportation, and both security and technical costs of the film presentation and (b) an IR form is prepared for the Building Manager, Bryan University Center, to cover costs for the employment of a house manager and a projectionist. Information which will be needed at this time includes: (1) rating of film (2) running time of film (3) cost of film and cost of film transportation.
8. Return to the Calendar Office no later than three weeks before the date of film presentation. Leave the original white copy at the Calendar Office, the yellow copy with the Building Manager of the Bryan University Center, and keep the pink copy for the film presentation as official authorization. (Note: scheduling will be forfeited if all procedures are not completed within the three-week deadline.)

NB: For showing films in an area other than the Film Theater for which no admission is charged and no donation is taken, arrangements must be made with the Technical Services Office, 03 Page Building, for use of projectors and a projectionist. For such showings, take an IR form to this office. All film showings must be cleared with the Office of Cultural Affairs to avoid conflicts.

9. Commons areas in residence halls and other such University facilities may not be used for the showing of "stag" films. In addition, such areas may not be used by individuals or groups for performances by strippers.

SAFETY

No institution can guarantee the safety of all students at all times. It is therefore recommended that students exercise caution at times and places known to be hazardous. It is recommended that students not study in a classroom alone or walk alone in unlighted portions of the campus or between campuses after dark. The Public Safety Office (684-2444) may be called to request escort service.

1. Do not walk, jog, or bike alone outside of well-populated areas.
2. Keep your room and apartment door locked *at all times* whether or not you are present.
3. After the closing hours of women's residence halls, all external doors should be kept locked or closed.
4. Immediately report to the Public Safety Office, 911, or 684-2444, any incident taking place that threatens safety or appears suspicious.

SOLICITATION POLICY

Commercial selling or soliciting in the residence halls is prohibited whether by residents or nonresidents.

The Bryan Center environs may be used for the purpose of sales, distribution, or events involving the use of sound amplification equipment. Any such activity must be sponsored by a recognized campus organization and requires the prior approval of the Office of Student Activities.

STUDENT RECORDS

In accordance with the Family Education Rights and Privacy Act of 1974, Duke University generally permits students to inspect their educational records and protects the information in such records from disclosure to third parties without the students' consent. The University's policy on the release of students' records is on file in the Office of the University Registrar.

Address and telephone information provided to the Office of the Registrar may be released without student consent unless written notification is provided to the office.

TRAFFIC REGULATIONS

Motor vehicles must be registered annually at the beginning of the fall semester or, if a vehicle is acquired later, within five days after bringing it to the campus. All registration takes place in the Traffic Office, 2010 Campus Drive, and at other places and times as announced. Students in the School of Medicine and other Medical Center programs, residents of Hanes House, Hanes Annex, and Trent Hall, will all register through the Medical Center Traffic Office at places as announced. There is an annual parking fee, determined by location and status. Students must present a current semester enrollment card and student identification card.

Upon registration of a motor vehicle, students will receive a copy of the University motor vehicle regulations. Operation of a motor vehicle on the campus is contingent upon compliance with these regulations.

All vehicles parked illegally, including bicycles, motor bikes, motor scooters, and motorcycles parked within the residential hall buildings, may be subject to towing.

VENDING AND ELECTRONIC GAMES (PIN-BALL, FOOS-BALL, ETC.) EQUIPMENT

Only University-owned vending and electric game equipment is permitted in the residence halls. Living groups interested in renting this type of equipment should contact Duke University Vending Services, a service component of the Duke University Stores. Such equipment rented from sources outside the University is prohibited.

VIDEO CASSETTE RECORDERS

Students are advised that Federal copyright law restricts the use of video cassette recorders to private showings and prohibits their public performance.

POLICY ON NONDISCRIMINATION

Duke University does not discriminate on the basis of age, race, color, national and ethnic origin, sex, or handicap, in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. Inquiries concerning the University's responsibility may be directed to Dolores L. Burke, University Equal Opportunity Office, telephone: 919-684-6578.

Academic Honesty



Use and Acknowledgement of Sources

THE IMPORTANCE OF ACADEMIC INTEGRITY

Independent learning and the acceptance of individual responsibility are values which are highly regarded among undergraduates at Duke University. It is recognized that personal integrity, and the achievement of genuine scholarship in a community of mutual respect, depend upon the commitments of students as well as faculty to these ideals.

Independent learning sometimes involves one in an investigation of novel data or ideas, and in the formulation of original hypotheses. Yet for most college students, independent learning means the patient search for information, the sifting of criticism which others have published, and the use of this material in the statement and defense of their own conceptions and judgements. From the reading of books, periodicals, and other printed materials, research papers and original compositions are written in partial fulfillment of course requirements. It is therefore of importance that all students understand what is expected of them in using and acknowledging such source materials.

Some entering students may have given little, if any, thought to the issue of academic honesty, for they may have been permitted to copy word for word encyclopedias and other reference works without the use of quotation marks. More perhaps have become accustomed to paraphrasing other peoples' ideas without giving credit to whom credit is due. Some students, who have recognized such common forms of plagiarism and avoided them may have fallen into habits of writing which are nonetheless dishonest. A chief contributing factor is a careless manner of notetaking, in which a student's own comments become hopelessly entangled with the words and phrases copied from sources. When notes of this kind are used as a basis for a report, one usually is either unable to identify clearly the ideas which are not his own, or else, since the sources are not open before him at the time of writing, he can easily suppose that no credit need be given. In this way essentially honest students can and do unwittingly undermine their own academic integrity, and that of the community of scholars to which they belong.

It is sometimes protested that educators are too scrupulous in this matter, that there are so many borderline cases as to make the maintenance of standards impracticable. Are not books written to be used by anyone who chooses to rely on them? Do not researchers publish their ideas for others to share? How is one able to distinguish clearly between privileged information and public or common knowledge? Yet thoughtful consideration will lead one to see why honesty is the *sine qua non* of schol-

arship, the essential binding principle of any sound academic community and why scrupulosity in this matter is necessary.

A scholar's contributions are his ideas and insights; these are his actual achievements. While in college he receives recognition for his ideas and skills in the form of grades and credit toward graduation and, in some cases, scholarship awards. After graduation, he may be offered fellowships for graduate study or job opportunities on the basis of these accomplishments. Such things are posited on the faith that a scholar's work and achievements are his own, and that his record indicates accurately the extent to which he is able to organize in his own way that knowledge which is important to the work he is fitted to do. Unless the evaluation of each student's accomplishment is based on his real abilities, on work actually done and rewards gained, his college record becomes a fraudulent document, and an unfair advantage is gained over other students whose scholarship is honestly represented. Among the many factors essential to the good life of a quality college, commitment to the value of academic integrity is crucial. Students assume individual responsibility in this matter; their failure to do so, for whatever cause, is especially lamentable.

The following is published to provide basic information on the subject. First, there is reproduced a definition of plagiarism which, by furnishing examples, illustrates the improper use of source material. The appendix is a statement written by the chairman of the judicial board of the undergraduate colleges.

A DEFINITION OF PLAGIARISM

The academic counterpart of the bank embezzler and of the manufacturer who mislabels his product is the plagiarist, the student or scholar who leads his reader to believe that what he is reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows: merely the warning with which this definition concludes would be enough. But it is apparent that sometimes men of good will draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection.

The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, *both* of which are necessary. (This includes, of course, the copying of all or any part of another student's paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so admirably expresses one's opinion that one is tempted to make it personal property. Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit—but more the result, perhaps, of laziness than of bad intent—is the patching together of random jottings made in the course of reading, generally without careful identification of their sources, then woven into the text, the cement to hold the pieces together. Indicative of more effort and for that reason, somewhat closer to honesty, though still dishonest, is the paraphrase, an abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgment that another person's text has been the basis for the recapitulation.

The examples given below should make clear the dishonest and the proper use of source material. If instances occur which these examples do not seem to cover, conscience will in all likelihood be prepared to supply advice.

THE SOURCE

The importance of the Second Treatise of Government printed in this volume is such that without it we should miss some of the familiar features of our own government. It is safe to assert that the much criticised branch known as the Supreme Court obtained its being as the result of Locke's insistence upon the separation of powers, and that the combination of many powers in the hands of the executive under the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein, the effect of which is not spent, though the relationship may not be consciously traced. Again we see the crystallizing force of Locke's writing. It renders explicit and adapts to the British politics of his day the trend and aim of writers from Languet and Bodin through Hooker and Grotius, to say nothing of the distant ancients, Aristotle and the Stoic school of natural law. It sums up magisterially the arguments used through the ages to attack authority vested in a single individual, but it does so from the particular point of view engendered by the Revolution of 1688 and is in harmony with the British scene and mental climate of the growing bourgeoisie of that age. Montesquieu and Rousseau, the framers of our own Declaration of Independence, and the statesmen (or should we say merchants and speculators?) who drew up the Constitution have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. In the hands of these it has been the quarry of liberal doctrines; and that it has served the Socialist theory of property based on labor is final proof of its breadth of view.

CHARLES L. SHERMAN,
"Introduction" to John Locke,
*Treatise of Civil Government and A
Letter Concerning Toleration.*

1. WORD-FOR-WORD PLAGIARIZING

It is not hard to see the importance of the Second Treatise of Government to our own democracy. Without it we should miss some of the most familiar features of our own government. It is safe to assert that the much criticized branch known as the Supreme Court obtained its being as a result of Locke's insistence upon the separation of powers; and that the combination of many powers in the hands of the executive under the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein, the effect of which is not spent, though the relationship may not be consciously traced. The framers of our own Declaration of Independence and the statesmen who drew up the Constitution have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. All these are marks of the influence of Locke's *Second Treatise* on our own way of life.

In this example, after composing half of a first sentence, the writer copies exactly what is in the original text, leaving out the center section of the paragraph and omitting the names of Montesquieu and Rousseau where he takes up the text again. The last sentence is also the writer's own.

If the writer had enclosed all the copied text in quotations marks and had identified the source in a footnote, he would not have been liable to the charge of plagiarism; a reader might justifiably have felt, however, that the writer's personal contribution to the discussion was not very significant.

2. THE MOSAIC

The crystallizing force of Locke's writing may be seen in the effect his *Second Treatise of Government* had in shaping some of the familiar features of our own government. That much criticized branch known as the Supreme Court and the combination of many powers in the hands of the executive under the New Deal are modern examples. But even the foundations of our state—the Declaration of Independence and the Constitution—have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. True, the influence of others is also marked in our Constitution—from the trend and aim of writers like Languet and Bodin, Hooker and Grotius, to say nothing of Aristotle and the Stoic school of natural law; but the fundamental influence is Locke's *Treatise*, the very quarry of liberal doctrines.

Note how the following phrases have been lifted out of the original text and moved into new patterns:

crystallizing force of Locke's writing
some of the familiar features of our own government
much criticised branch known as the Supreme Court
combination of many powers in the hands of the executive under the New Deal
have re-echoed its claims for human liberty...property
from the trend and aim...Grotius
to say nothing of Aristotle and...natural law
quarry of liberal doctrines

As in the first example, there is really no way of legitimizing such a procedure. To put every stolen phrase within quotation marks would produce an almost unreadable, and quite worthless, text.

3. THE PARAPHRASE

Paraphrase: Many fundamental aspects of our own government are

Original: Many familiar features of our own government are apparent in the *Second Treatise of Government*. One can safely assert that the oft-censured Supreme Court really owes its existence to the lockean demand that powers in government be kept separate; equally one can say that the allocation of varied and that the combination of many powers the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein...Once more it is contrary to the principles enunciated herein...Again we see it is possible to note the way in which Locke's writing clarified the crystallizing force of Locke's writing.
existing opinion.

The foregoing interlinear presentation shows clearly how the writer has simply traveled along with the original text, substituting approximately equivalent terms except where his understanding fails him, as it does with "crystallizing," or where the ambiguity of the original is too great a tax on his ingenuity for him to proceed, as it is with "to encounter opposition...consciously traced" in the original.

Such a procedure as the one shown in this example has its uses; for one thing, it is valuable for the student's own understanding of the passage; and it may be valuable for the reader as well. How, then, may it be properly used? The procedure is simple. The writer might begin the second sentence with: "As Sherman notes in the introduction to his edition of the *Treatise*, one can safely say..." and conclude the paraphrased passage with a footnote giving the additional identification necessary. Or he might indicate directly the exact nature of what he is doing, in this fashion: "To paraphrase Sherman's comment..." and conclude that also with a footnote indicator.

In point of fact, this source does not particularly lend itself to honest paraphrase, with the exception of that one sentence which the paraphraser above copied without change except for abridgment. The purpose of paraphrase should be to simplify or to throw a new and significant light on a text; it requires much skill if it is to be honestly used and should rarely be resorted to by the student except for the purpose, as was suggested above, of his personal enlightenment.

4. THE "APT" TERM

The *Second Treatise of Government* is a veritable quarry of liberal doctrines. In it the crystallizing force of Locke's writing is markedly apparent. The cause of human liberty, the principle of separation of powers, and the inviolability of private property—all three major dogmas of American constitutionalism—owe their presence in our Constitution in large part to the remarkable *Treatise* which first appeared around 1685 and was destined to spark within three years, a revolution in the land of its author's birth, and ninety years later, another revolution against that land.

Here the writer has not been able to resist the appropriation of two striking terms—"quarry of liberal doctrines" and "crystallizing force"; a perfectly proper use of the terms would have required only the addition of a phrase: The *Second Treatise of Government* is, to use Sherman's suggestive expression, a "quarry of liberal doctrines." In it the "crystallizing force"—the term again is Sherman's—of Locke's writing is markedly apparent...

Other phrases in the text above—"the cause of human liberty," "the principle of the separation of powers," "the inviolability of private property"—are clearly drawn

directly from the original source but are so much matters in the public domain, so to speak, that no one could reasonably object to their reuse in this fashion.

Since one of the principal aims of a college education is the development of intellectual honesty, it is obvious that plagiarism is a particularly serious offense, and the punishment for it is commensurately severe. What a penalized student suffers can never really be known by anyone but himself; what the student who plagiarizes and "gets away with it" suffers is less public and probably leaves a mark on him as well as on the institution of which he is a member.

STATEMENT BY THE CHAIRMAN OF THE UNDERGRADUATE JUDICIAL BOARD

Duke University, as a community of scholars, strongly relies upon the standard of academic integrity. Plagiarism and other forms of academic dishonesty represent a corruption of this integrity and, as such, cannot be tolerated within the community.

The Undergraduate Judicial Board actively affirms the requirement that every undergraduate student at Duke read and understand the "Statement on Academic Honesty." This statement provides a definitive explication of what is required, in terms of academic honesty, of each student in the community. It has been the sad experience of the board that many cases of academic dishonesty are the result of ignorance as to what exactly constitutes this dishonesty. We firmly urge that each student refer to the statement whenever there is any question about matters of academic honesty. This small investment in time almost certainly outweighs the possibility of badly damaging one's academic career through ignorance or carelessness.

Ignorance of what constitutes academic dishonesty is no excuse for actions which violate the integrity of the community. The board must view any offense of academic dishonesty with the utmost gravity and will determine sanctions commensurate with the severity of the violation. In a community which builds on the notion of academic integrity, the threat of academic dishonesty represents an intolerable risk.

Appendices



Appendix A

DUKE UNIVERSITY LICENSE TO OCCUPY RESIDENCE HALL SPACE

FULL NAME: _____
(last) (first) (middle) (present living group)

HOME ADDRESS: _____
(social security number)

DUKE UNIVERSITY HEREBY LICENSES THE UNDERSIGNED TO OCCUPY A RESIDENCE HALL SPACE FOR THE ACADEMIC YEAR INDICATED BELOW DURING THE PERIODS WHEN RESIDENCE HALLS ARE OFFICIALLY OPEN FOR OCCUPANCY BY LICENSED STUDENTS. THE OFFICIAL OPENING AND CLOSING DATES OF RESIDENCE HALLS AND RECESS PERIODS DURING THE YEAR WHEN RESIDENCE HALL ARE NOT OPEN FOR OCCUPANCY ARE PUBLISHED BY THE DEPARTMENT OF HOUSING MANAGEMENT. THIS LICENSE AUTOMATICALLY TERMINATES IF THE STUDENT OFFICIALLY WITHDRAWS, GRADUATES, OR CEASES FOR ANY REASON TO BE A FULL-TIME STUDENT.

I have read the accompanying terms under which I may occupy residence hall space, and I understand that my continued occupancy is conditioned on my compliance with these terms and all applicable University regulations. If I violate these terms and regulations, the University may revoke this license and may refuse to license me for any occupancy period subsequent to the one provided in this license. I further understand that the terms of this agreement and University regulations are subject to reasonable changes and that, provided I have been notified of such changes, the University may revoke this license should I violate any term or regulation in effect during my occupancy under this license.

Nothing in this license shall be interpreted as relief from the duty to comply with federal, state, and local law, and violation of any applicable law may be reason for revocation of this license.

In consideration of this license, I agree to pay the University according to the schedule of payments for the type of space I occupy as approved by Duke University, a copy of which has been furnished. I understand that, in the event the University revokes this license because I have violated the terms of this agreement or University regulations, I must vacate the room I am occupying immediately and the University shall not refund any portion of the payment made for the semester in progress. In the

event I officially withdraw, graduate, or cease for any reason to be a full-time student, I agree to vacate the space I am occupying within forty-eight (48) hours; I understand that I will be charged for that semester's housing based on the number of days I have occupied that space and will receive a refund for any amount I have paid for housing beyond the time of my departure.

ACADEMIC YEAR 19 _____ -19 _____ FOR DUKE UNIVERSITY

Date _____

Signature of Student _____

SPACE REQUESTED AND RESERVED

Requested by student _____

Room number _____

House _____

Reserved by University _____

Room number _____

House _____

ROOM DESCRIPTION

Type of Room:

☐ Single

☐ Double

☐ Single as double*

☐ Double as triple*

☐ with bath

D.U.H.M. #45

Revised 1/29/85

TERMS UNDER WHICH DUKE UNIVERSITY LICENSES OCCUPANCY OF RESIDENCE HALL SPACE

The purpose of these terms is to establish mutual understanding among students who reside in Duke's residence halls and between these students and the University with regard to use of residential facilities. These terms are an integral part of the license and are enforceable covenants and conditions of the license. Any violation of the terms could lead to revocation of this license and/or disciplinary action. Occupants are responsible for the actions of their guests.

These terms apply only during periods when residence halls are officially open for occupancy by licensed students. A student in the residence halls at any other time may be trespassed from the premises.

*Undergraduate students assigned to single rooms converted for double occupancy and double rooms for triple occupancy may be moved to other rooms or to normal single or double rooms to improve student living conditions and to ensure better use of facilities. The student will be financially responsible for the announced rate for a normal single or double room as applicable. Vacancies occurring in single rooms used as doubles or in double rooms used as triples will make that (those) remaining occupant(s) financially responsible for the announced rate for a single or double room as applicable for the remainder of the term of the license.

I. RESERVATION, ASSIGNMENT, AND ROOM CHANGE PROCEDURES

- A. The license will not be effective unless accompanied by a signed board contract for the same academic year.
- B. Reservations for preregistered upperclass students who have paid residential deposits and the fifty (\$50) prepayment of rent will be made in accordance with procedures announced by the Dean for Residential Life. Every effort will be made to assign students in accordance with their preferences; however, the Dean or designee reserves the right to make or change final room assignments if in his/her judgment such reassignments are necessary.
- C. Exchange or transfer of rooms by students may be made only by the following procedure: (1) approval of room change by the Dean for Residential Life or designee (2) official inspection of vacated room by the Department of Housing Management (3) change of keys in appropriate key office. In all of the above, the student(s) seeking the change is (are) responsible for making appointments and arrangements. Any unofficial room change may lead to revocation of this license and will not relieve the student(s) involved of their obligation to pay occupancy, damages, and other costs for their assigned rooms(s).
- D. Vacancies existing in rooms will be filled by the Dean for Residential Life or designee.
- E. Undergraduate students assigned to single rooms converted for double occupancy and double rooms for triple occupancy may be moved to normal single or double rooms to improve student living conditions and to ensure better use of facilities. The student will be financially responsible for the announced rate for a normal single or double room as applicable.
- F. Vacancies occurring in single rooms used as doubles or in double rooms used as triples will make that (those) remaining occupant(s) financially responsible for the announced rate for a single or double room as applicable for the remainder of the term of the license.

II. PROCEDURES, MAINTENANCE, STORAGE, AND DAMAGES

- A. Maintenance will be performed normally on a routine basis; however, corrective, emergency, and preventive maintenance will be accomplished as necessary.
- B. The University retains the right to enter the premises without the resident being present for routine maintenance, to conduct inspections regarding availability of space, and in case of emergency or failure of equipment which is causing damage or hazard to property or persons. Entry into the room for other reasons will be made during reasonable hours with notice to the assigned occupants.
- C. The Department of Housing Management cleans each room prior to occupancy. Thereafter it is the responsibility of the resident(s) to clean the room. The room is expected to be left in a clean condition by the vacating resident(s). If a room requires excessive cleaning after occupancy, the cost will be charged to the resident(s). Housekeeping services will be provided on weekdays during the academic year (excluding holidays) in common areas only of the residence halls. The cost of extraordinary cleaning resulting from a living group's activities will be charged to the living group.
- D. The University is not liable for damage to or loss of personal property. Since the University does not provide insurance, occupants are encouraged to provide their own personal property insurance.
- E. The University is not liable for the failure or interruption of utilities (including air-conditioning in those residential facilities in which air conditioning units

have been installed) or for damages resulting from failure or interruption of the same. Residents are not entitled to any compensation or abatement of rent.

- F. Use of nails, screws, tacks, or adhesives which damage walls, furniture, or fixtures is prohibited. Advice on nondamaging ways of hanging artwork and other items is available from Housing Management.
- G. Buildings, building equipment, and furniture repairs or replacements necessitated by damage beyond normal wear and tear will be billed to the appropriate student(s) or living group in accordance with official procedures published by Housing Management. At the end of each academic year, outstanding living group charges will be divided equally among the group's members and charged to their student ledgers.
- H. The assigned occupant(s) is (are) responsible for reporting to Housing Management defects or damages found in a room within five working days after occupancy. (Forms are provided for the initial inspection by the Department of Housing Management.) The resident(s) of a room will be charged for any damages or modifications found in the room after occupancy unless previously noted on the inspection form.
- I. Each bedroom is equipped with furniture by the Department of Housing Management. The resident(s) of a room will be charged for any furniture missing from that room. Additional furniture may be added to the room by a resident provided all residents of that room consent.
- J. Students are collectively responsible for care of public area furnishings and equipment. University owned commons furniture may not be removed from its intended location. Commons furniture found in bedrooms may be removed by University personnel at the expense of the occupant(s).
- K. Each resident is required to obtain a room key at the time of his/her occupancy. A deposit for this key will be charged at the rate published by the Department of Housing Management, which deposit is refundable only if the key is returned to the appropriate service office within forty-eight (48) hours of vacating the assigned space.
- L. Resident students may place empty trunks, luggage, and packing cartons (e.g., stereo boxes) in storage rooms during the effective period of this license at no charge. The University takes no responsibility for the items stored or their contents. Procedures for storage on a fee basis are available from the Department of Housing Management.
- M. Non-University property left in rooms after the license period terminates will be disposed of at the discretion of Housing Management.

III. TERMS AFFECTING RIGHTS, ORDER, HEALTH, AND SAFETY

The following terms are designed to protect the health and safety and to provide for the comfort and privacy of all students who are licensed to occupy residence hall space. In addition to the following specific terms, any conduct which reflects a serious disregard for the rights, health, security, and safety of other occupants of the residence halls will be regarded as a violation of the license.

- A. Students are entitled to privacy in their assigned rooms as set forth in the University Privacy Policy published in the *Bulletin of Information and Regulations*. Sanitary or safety inspections may be conducted by government officials without notice in accordance with the general statutes of North Carolina and city and county ordinances. When the residence halls are officially closed during Christmas recess, inspections of rooms will be made by University

officials to ensure that no fire or health hazards exist. Hazardous items will be removed and the student(s) involved will be notified when the buildings are officially opened.

- B. Every occupant of residence halls equipped with a security system will receive a card key or entrance door key. A deposit for this card key will be charged at the rate published by the Department of Housing Management, which deposit is refundable only if the card key is returned to the appropriate service office within 48 hours after vacating the assigned space. Propping open outside residence hall doors or in any way tampering with the security system of the residence hall is also prohibited.
- C. The unofficial use or possession of residence hall keys, including possession of master keys or keys other than those assigned to the student, is prohibited. Keys and card keys are not transferable; switching keys with other students is prohibited.
- D. Lost/stolen keys must be reported immediately to the appropriate service office and a replacement key must be obtained with payment of an additional deposit. The deposit on the lost/stolen key will be forfeited and the bedroom door lock will be changed if the resident is unable to present the lost/stolen key to the service office within two weeks.
- E. Except in case of fire, fire fighting equipment and alarms shall not be tampered with and shall remain in place. Residents must comply with all fire drills and fire regulations.
- F. Personally owned air-conditioning equipment is not permitted in residence hall areas. Compliance with any existing University energy conservation policy is required.
- G. Tampering with electrical wiring, including but not limited to, the installation of direct wired ceiling fans and dimmer switches is prohibited.
- H. Locks and plumbing are not to be tampered with or changed by occupants.
- I. Damage caused by electrical appliances which are not owned by Duke University is the responsibility of the resident(s).
- J. Waterbeds are prohibited.
- K. In accordance with North Carolina General Statute 14-269.2, no firearms, explosives, fireworks, highly inflammable materials, or any articles which may be used as offensive weapons may be in the residence halls or on the campus. This includes knives, slingshots, clubs, pellet guns, rifles, BB guns, and all firearms and items of like kind.
- L. Animals, including, but not limited to, birds and reptiles, are not allowed in the residence halls even for short periods. Fish are allowed provided they are kept in an aquarium no larger than twenty-five gallons, the container is cleaned regularly, and no illegal species are kept.
- M. No personal effects may be left in the hallways, stairwells, or common areas of the residence halls; any personal effects so found will be disposed of at the discretion of the Department of Housing Management.
- N. Selling or soliciting in the residence halls, by residents or outsiders, that is either commercial or unrelated to University objectives or activities is prohibited.
- O. A room may be occupied only by the student holding a license for that room. This license may not be transferred by the student to another person. Guests are permitted in student's rooms and common areas for reasonable periods of time subject to the specified residence hall visitation policies for each residential unit.
- P. Motor vehicles may not be stored or maintained at any time in any residence hall area not designated for that purpose. Bicycles may be retained by the owner in his or her assigned bedroom space, but may not be stored in com-

mons, baths, corridors, entrances, or other residence hall spaces. Motor vehicles and bicycles in unauthorized areas will be removed. Students will be required to pay removal fees in order to recover such vehicles. The University assumes no responsibility for damage to such vehicles or their safety devices.

- Q. Access to roofs and attic space is forbidden.
- R. Candles or other open flame devices in the residence halls are prohibited unless permission is obtained from Duke University Safety Office upon application in writing and upon presentation of proper justification.
- S. Platforms, partitions, or similar structures (e.g., lofts), must not be erected anywhere in the residence halls by students or living groups without the written approval of the Director of Housing Management or designee.

IV. PAYMENTS, RETENTION OF PAYMENTS, AND TERMINATION OF LICENSE

- A. Students pay for their license on a semester basis. Payments are to be made to the Office of the Bursar in accordance with established terms of that office.
- B. A prepayment of fifty (\$50) dollars must be paid by the deadline date published by the Residential Life Office in the spring by every resident student desiring to reserve a space in University housing for the following academic year. This fee will be applied to rent for the fall semester. The rent prepayment is not refunded to students who cancel their housing reservation after the last day of spring semester classes, unless the student is involuntarily withdrawn from the University.
- C. A one hundred dollar (\$100) residential deposit must be paid by each freshman upon admission to the University. While living in University housing, it is understood and agreed that the residential deposit shall not be applied to fees. Upon permanently vacating University housing, Duke shall, within ninety (90) days, refund said deposit, less any outstanding fees incurred in accordance with the established University policy. Charges for damages in excess of the residential deposit shall be assessed to the student. The residential deposit will not be refunded, after residential space is reserved, to new students who fail to matriculate. Currently enrolled students will receive a refund of the residential deposit if written cancellation is received by Residential Life by July 1 for the fall semester and by December 1 for the spring semester.
- D. For upperclass students, the academic year license to occupy space entitles a student to occupy his/her residence hall space from noon of the second day before freshman orientation begins to noon of the day after commencement. Licenses for all freshmen begin on noon of the first day of orientation and terminate twenty-four (24) hours after the last scheduled spring examination. Students who have not moved out by the deadline will be moved out by Housing Management.
- E. Undergraduate students who have been assigned a room who wish to cancel their assignment must notify the Office of Residential Life in writing. Students who cancel their assignments after the contract has begun will be entitled to a refund of the unused rent, the amount to be determined by the date of written notification to the Office of Residential Life or the date of vacating the residence halls, whichever is later. In any case a minimum of \$50 will be retained by the Department of Housing Management.

Prior to the implementation of proposed amendments to the terms set forth above, such proposed amendments shall be submitted to the Residential Policy Committee and ASDU for their consideration and comment.

D.U.H.M. Form #46
Revised 1/29/85

DUKE UNIVERSITY LICENSE TO OCCUPY SPACE IN CENTRAL CAMPUS FACILITIES

NAME: _____

HOME ADDRESS: _____
Street # or P.O. Box

ASSIGNED LOCATION: _____
City State Zip

PERIOD: from noon _____ to noon _____

Duke University hereby licenses the undersigned to occupy space in the above named location for the period indicated above subject to the rules, regulations, and other terms of this licensing agreement and all applicable University regulations. Due to the economics of operating these units, this license will not be revoked to permit students to move to other University housing facilities or to move off campus.

I have read the rules, regulations, and other terms of this agreement, a copy of which has been furnished, under which I may occupy space in University housing and I understand that my continued occupancy is conditioned on my compliance with these terms and all applicable University regulations. (Attention is especially directed to Part III of the rules, regulations, and other terms.) If I violate any of these rules, regulations, and other terms, the University may revoke this license and may refuse to license me for any occupancy period subsequent to the one provided in this license. I further understand that the rules, regulations, and other terms of this agreement and University regulations are subject to reasonable changes and that, provided I have been notified of such changes, the University may revoke this license should I violate any rules, regulations, or other terms in effect during my occupancy under this license.

Nothing in this license shall be interpreted as relief from the duty to comply with federal, state, and local law, and violation of any applicable law may be reason for revocation of this license.

In consideration of this license, I agree to pay the University according to the schedule of payments for the type of space I occupy as approved by Duke University, a copy of which has been furnished. I understand that, in the event the University revokes this license because I have violated any of the rules, regulations, or other terms of this agreement or University regulations, I must vacate the space I am occupying immediately and the University shall not refund any portion of the payment made for the semester in progress. In the event I officially withdraw, graduate, or cease for any reason to be a full-time student, I agree to vacate the space I am occupying within forty-eight (48) hours; I understand that I will be charged for that semester's housing based on the number of days I have occupied that space and will receive a refund for any amount I have paid for housing beyond the time of my departure.

(for Duke University) (Signature of Student)

Date Date

RULES, REGULATIONS, AND OTHER TERMS FORMING A PART OF THE LICENSE OF CENTRAL CAMPUS APARTMENTS, TOWN HOUSE APARTMENTS, AND MODULAR HOMES

One purpose of these terms is to establish a mutual understanding among students and the University with regard to use of facilities in Central Campus Apartments, Town House Apartments, and Modular Homes. These rules, regulations, and other terms are an integral part of this license and are enforceable as covenants and conditions of the license. For further information please refer to the Central Campus Handbook.

I. ELIGIBILITY

Units in the facilities are available for assignment to any full-time Duke University student who is working toward a degree. Students who withdraw from school or take a leave of absence must vacate the apartment within forty-eight (48) hours from date of such withdrawal or leave.

II. PAYMENTS:

- A. **Prepayment:** A fifty (\$50) prepayment fee must be paid by eligible students who wish to participate in sign-up for a subsequent academic year. This prepayment will be credited to the fees for the fall semester. The rent prepayment is not refunded to students who cancel their housing reservation after the last day of spring semester classes unless the student is involuntarily withdrawn from the University and notifies the Department of Housing Management in writing of the cancellation within ten days of the withdrawal date.
- B. **Residential Deposits.** Unless previously paid, a student who wishes to reserve a unit in Central Campus Apartments, Town House Apartments or Modular Homes must submit a residential deposit of one hundred dollars (\$100) together with an application to the Manager, Housing Administration. While living in University housing, it is understood and agreed that the residential deposit, shall not be applied to housing fees. Upon termination of this license and vacating University housing, Duke shall, within ninety (90) days, refund said deposit, less any outstanding fees incurred in accordance with the established University policy. Charges for damages in excess of the residential deposit shall be assessed to the student. The residential deposit will not be refunded after an assignment has been made to students who cancel their assignments, forfeit their assignments, or fail to occupy the residential space except in the following instances. A student who has paid a prepayment for a subsequent academic year will receive a refund of the residential deposit if written cancellation is received and approved by Housing Management by July 1. A student residing in University housing for the fall semester will receive a refund for the spring semester is received and approved by Housing Management by December 1.
- C. **Key Deposit.** Each resident of a housing unit will receive one key to the unit and one mailbox key at the time of his/her occupancy. A deposit for each of these keys will be charged at the rate published by the Department of Housing Management, which deposit is refundable only if the key(s) is(are) returned within forty-eight (48) hours of the termination of this license.
- D. **Housing Fees.** Payments for housing are to be made to the Office of the Bursar before occupancy in accordance with established terms of that office. Payments are to be made on a semester basis.

III. RESERVATION, ASSIGNMENT, SPACE CHANGE, AND CANCELLATION PROCEDURES

- A. Applicants for spaces in Central Campus Apartments, Town Houses, and Modular Homes will be assigned in order of dates of receipt of applications and the required deposit. Graduate students and undergraduate students who are presently enrolled will be assigned in accordance with procedures published by the Department of Housing Management.
- B. The number of students to be assigned to various types of units is established by the Department of Housing Management.
- C. Every effort will be made to assign the student in accordance with his or her preference. Because this is not always possible, the Manager, Housing Administration, or designee, retains the authority to make final space assignments.
- D. The exchange or transfer of apartments may be made only upon approval of the Manager, Housing Administration. It is the responsibility of a student vacating space or exchanging apartments to make the apartment ready for the new tenant. The space to be vacated will be inspected by a representative of Housing Management to relieve the vacating student of financial responsibility for damage occurring after the student vacates. Any unofficial apartment change may be reason for revocation of this license and will not relieve the student(s) involved of the obligations to pay occupancy, damage, and other cost for the assigned space.
- E. The Department of Housing Management makes no effort to assign individual bedroom space within each unit. That responsibility is left to the assigned occupants.
- F. Units shall not be occupied in whole or in part by any person other than those regularly assigned by the Manager, Housing Administration, nor may occupants sublet assigned space. Any attempted agreement to sublease without the Manager, Housing Administration or designee's consent, shall be void. Guests are permitted for short periods only provided all residents of that unit are in consent.
- G. The Manager, Housing Administration or designee, reserves the right to change space assignments if in his/her judgment such change(s) are necessary.

IV. PROCEDURES, MAINTENANCE, STORAGE, AND DAMAGE

- A. Maintenance to buildings, fixtures, utilities, equipment, furniture, and furnishings will be performed on a routine basis; however, corrective emergency and preventive work will be performed as necessary.
- B. Prior to occupancy, the Department of Housing Management will clean each vacant unit and will correct deficiencies. An inspection form will be made available for each apartment. Each assigned student should note on the form the condition of the apartment and furnishings at the time of occupancy to prevent misunderstandings. Instructions on the form must be followed.
- C. Occupants shall maintain the demised premises, the furnishings and equipment therein in good condition and shall be responsible for all broken windows and door glass and other damage beyond normal wear and tear, including failure of plumbing or equipment caused by misuse. In such cases, occupants shall be assessed the cost of materials and labor as invoiced by the Department of Housing Management for repairs, replacements, or reassembly. The Department of Housing Management shall have routine maintenance performed and agrees to make such repairs as may be rendered necessary insofar as the cause thereof does not arise from the willful acts or negligence

- of the occupant(s). No alteration, addition, or painting may be conducted within the premises by the occupant(s).
- D. Locks and plumbing are not to be tampered with or changed by residents.
 - E. The University retains the right to enter the premises without the tenant being present in cases of emergency or failure of equipment which is causing damage or hazard to property or persons, to conduct inspections to determine availability of space and for routine maintenance. Entry into the apartment for other reasons will be made during reasonable hours with notice to the assigned occupant(s).
 - F. Non-University property left in apartments after the license period terminates will be disposed of at the discretion of Housing Management.
 - G. The unofficial use or possession of apartment keys, including possession of master keys or keys other than those assigned to the student, is prohibited.
 - H. Lost/stolen keys must be reported immediately to the Central Campus Service Office and a replacement key must be obtained with payment of an additional deposit. The deposit on the lost/stolen key will be forfeited and the lock(s) to the apartment will be changed if the resident is unable to present the lost/stolen key to the Central Campus Service Office within two weeks.
 - I. The University is not liable for damage or loss of personal property or failure of interruption of utilities. Since the University does not provide insurance, occupants are encouraged to provide their own personal property insurance.
 - J. The University is not liable for damage, failure, or interruption of utilities. Interruption or curtailment of such services will not entitle the resident to any compensation.
 - K. University-owned furniture or equipment placed in the unit may not be removed from the unit.
 - L. Pianos, washing machines, dryers, dishwashers, radio transmitters, and waterbeds are not authorized in these units. Antennae may not be installed in any unit. Cable television on the Duke network is provided in the Central Campus Apartments.
 - M. Use of screws, hooks, decals, tacks, and adhesive on walls, furniture, or fixtures is prohibited. Small picture hanging nails provided by the Apartment Operations Office may be used; however, heavy items may not be hung.
 - N. Washing of cars in the Central Campus area is prohibited.
 - O. No dusting or shaking of mops, brooms, or other cleaning material from the windows, doors, and balconies is permitted.
 - P. No fences may be put up around the apartments.
 - Q. Outside clotheslines are prohibited.
 - R. Access to roofs and attic space is prohibited.

V. TERMS AFFECTING RIGHTS, ORDER, HEALTH, AND SAFETY

The following terms are designed to protect the health and safety and to provide for the comfort and privacy of all students who are contracted to occupy units in Central Campus Apartments, Town House Apartments, or Modular Homes. In addition to the rules, regulations, and other terms, any conduct which reflects a serious disregard for the rights, health, security, and safety of other residents will be regarded as a violation of the license.

- A. Combustible materials shall not be stored on the premises.
- B. Sidewalks, stairways, and entryways must not be used for purposes other than ingress or egress. Bicycles must not be left in these areas or other locations where they may cause harm to persons or groundskeeping equipment. Motorcycles must be parked in parking lots.

- C. Nothing shall be hung from balconies, porches, gutters, or stairwells.
- D. In accordance with North Carolina General Statute 14-269.2, no firearms, explosives, highly flammable materials, or any articles which may be used as offensive weapons may be in the Central Campus facilities. This includes slingshots, clubs, pellet guns, rifles, BB guns, and all firearms and items of like kind.
- E. Tampering with electrical wiring, including but not limited to the installation of direct-wired ceiling fans and dimmer switches is prohibited.
- F. Delivery trucks, automobiles, motorcycles, scooters, and minibikes will not be permitted on lawns and walkways, patios, or stairwells. These vehicles must be parked in legal parking spaces.
- G. No animals, birds, or reptiles of any kind shall be taken into or kept in or about the units. An extermination charge will be issued if an animal, bird, or reptile enters the apartment. Fish are allowed provided they are kept in an aquarium no larger than twenty-five gallons; the container is cleaned regularly; and no illegal species are kept.
- H. Residents shall maintain the areas adjacent to their apartments in a neat and orderly condition. No refuse, loose paper, cans, bottles, etc. shall be permitted to accumulate around the dwelling units. Any packing cases, barrels, or boxes used in moving must be removed by the occupants who are moving. Bulk refuse containers are located throughout the complex.
- I. Campers, trailers, boats, or similar units may not be parked in the parking lots or other areas at the Central Campus Apartments, Town House Apartments, or Modular Homes sites.
- J. Burning candles or other flames are prohibited in University housing.
- K. Any infectious or contagious diseases occurring within the apartment should immediately be reported to the Department of Housing Management.
- L. Selling or soliciting on the premises of University housing by residents or outsiders, that is either commercial or unrelated to University objectives or activities is prohibited.
- M. The apartment must be kept in good order and in a sanitary condition.
- N. Laundry rooms will not be used for storage of personal effects, bicycles or the like. The University is not responsible for lost or stolen clothing from laundries.
- O. The Town House pool may be used only by Town House residents and their guests. All users must observe swimming pool regulations published by Housing Management. Any user uses the pool at his/her own risk.
- P. Boisterous conduct in violation of the University noise policy is prohibited. Occupants are responsible for the conduct of their guests, and for any violation of these rules and regulations by a guests shall constitute a violation of same by occupants.
- Q. Fire extinguishers are placed in each apartment for the safety of occupants and as a safeguard of the property. Tampering with this equipment or use for any purpose other than extinguishing fires is prohibited.

VI. ENERGY CONSERVATION

All residents must comply with energy conservation programs as established by Duke University for residential facilities.

D.U.H.M. Form #44
Revised 1/29/85

Appendix B

1985/86 DUKE UNIVERSITY RESIDENTIAL FOOD SERVICES CONTRACT

1. Duke University policy requires that all undergraduate students residing on campus participate in the Dining Plan offered by Duke University Food Services. The only exception to this policy is that Central Campus residents are excluded from this requirement.
2. For Purposes of this Contract, hereafter Duke University Food Services shall be referred to as DUFS, and the contract participant shall be referred to as the contractor.
3. The contractor may select one of the Dining Plan options listed below (plans A-E). The contract shall be for one full academic year. The contract dollars purchased by the contractor shall be allocated on a semester to semester basis, with one half of this contract billed to your Bursar account prior to the beginning of each semester.
4. Dining contract dollars that are unused at the end of the first semester shall be carried forward to the second semester, but in no case shall second semester contract dollars be drawn against prior to the beginning of the second semester.
5. This contract shall be in effect for the period commencing the first day of Freshman Orientation in the Fall Semester and ending after dinner on the Monday, following graduation in the Spring Semester. Contract dollars remaining in the contractor's Dining Plan account at the end of the academic year shall be refunded based upon the schedule listed in 12-C and 12-D below.
6. The contractor may change the Dining Plan commitment to a different level of the second semester only during the period of Monday, September 30, 1985 through Friday, November 15, 1985. There will be a ten dollar (\$10) charge for any Dining Plan change.
7. Duke University's ID card shall be the medium by which you will access your Dining Plan contract dollars. This card must be presented to the cashier at the time of purchase, and shall be the only way of accessing your Dining Plan account.
8. The Dining Plan account is non-transferable, either in part or in whole. However, contractors may pay for a guest's transaction by way of their Dining Plan.
9. Duke University Food Services reserves the right to determine the hours and days of operation for all facilities, the menu and price of same, and all other operational requirement relative to this contract.
10. The Dining contract requires a ten dollar (\$10) non-refundable yearly fee plus one of the plans listed below:

PLAN	COST OF PLAN (excluding card fee)	+ BONUS \$	PURCHASING POWER
A.	\$1,272	\$ 0	\$1,272
B.	1,574	10	1,584
C.	1,744	20	1,764
D.	1,842	30	1,872
E.	1,990	50	2,040

11. Additional dollars may be added to any Dining Plan listed above in increments of \$50. All additional dollars purchased shall be at full value, with \$50 invested equalling \$50 worth of buying power.

12. REFUND POLICY

- A. Official Leave of Absence or Withdrawal during the semester as certified by the Registrar or appropriate Dean.

WITHDRAWAL OR LEAVE DATE

PERCENTAGE OF
CONTRACT TO BE
REFUNDED LESS
BONUS REFUNDED

FALL SEMESTER

Before Aug. 26, 1985

Aug. 26-Sept. 29, 1985

After Sept. 29, 1985

SPRING SEMESTER

Before Jan. 8, 1986

Jan. 8-Feb. 11, 1986

After Feb. 11, 1986

100%

50%

0%

- B. Student moving off-campus (including to Central Campus) shall be refunded at the full value of the remaining dollars in their account, *less* any bonus.
- C. Balance remaining at the end of the semester for a one semester contractor:

The first \$25. remaining

100% credited to your Bursar's
account, less any bonus

All dollars above the first \$25.

50% credit to your Bursar's account,
less any bonus

- D. Balance remaining at the end of the Academic year, for full academic year contractor:

The first \$50. remaining

100% credited to your Bursar's
account, less any bonus

All dollars above the first \$50.

50% credit to your Bursar's account,
less any bonus

13. Any food removed from the "All You Can Eat" dining areas must be purchased at the a la carte price.
14. Any misuse of this contract, in part or in whole, by the contractor shall be subject to the provisions of the Duke University Judicial Code.

Please indicate your choice of Dining Contract Plan by circling the appropriate letter:

A B C D E

Please Print or Type the following information:

FULL NAME _____ D.U. ID # _____

LOCAL ADDRESS _____ LOCAL PHONE _____

Please circle the appropriate descriptors below:

ON CAMPUS OFF CAMPUS FRESHMAN SOPHOMORE JUNIOR

SENIOR GRAD OTHER _____

EXPLAIN

I have read the above contract and accept the terms and conditions as set forth herein.

SIGNATURE _____ DATE _____

Please retain the last copy of this contract for your records.

Appendix C

JUDICIAL SYSTEM OF DUKE UNIVERSITY

Article I: The Judicial System

1.010 The judicial system of the University shall consist of the University Judicial Board, a Judicial Board for each of the communities hereafter defined (see Article III), and a Judicial Board for each of the residential units in the University.

Article II: The University Judicial Board

2.010 Jurisdiction

- a. The jurisdiction of the University Judicial Board shall be limited to cases arising out of the Pickets and Protests Regulations and cases involving more than one of the communities as determined by the Vice-President for Student Affairs in consultation with the Chancellor and the Chairman of the University Judicial Board.
- b. The University Judicial Board shall have jurisdiction over members of the student body, members of the faculty, and administrative personnel of the University not subject to the *Personnel Policy Handbook*.

2.015 Filing of Charges; Responsibilities of Vice-President for Student Affairs

- a. The Office of the Vice-President for Student Affairs shall have responsibility for receiving complaints, conducting investigations, and preferring charges concerning offenses within the jurisdiction of the board. The University Judicial Board shall hear no case without a finding of probable cause made by the Vice-President for Student Affairs, whose signature to the charge or charges shall constitute sufficient evidence of such finding.
- b. To assist the Vice-President for Student Affairs in the investigation of complaints, the gathering of evidence, and the preparation of charges, investigative and judicial aides may be appointed by the Vice-President and shall serve at his/her pleasure and under his/her direction. The number and specific duties of such aides shall be determined by the Vice-President for Student Affairs, who shall be fully responsible for all duties performed by them in their capacity as aides.
- c. The Vice-President for Student Affairs shall subpoena witnesses as directed by the University Judicial Board.
- d. The Vice-President for Student Affairs may delegate all or any portion of his/her duties as regards these judicial procedures to an aide or aides whose appointment is approved by the Vice-Provost and Dean of Undergraduate Instruction. The Vice-President for Student Affairs shall be responsible for the discharge of all duties thus delegated.

2.020 Membership

The University Judicial Board shall consist of a Chairman appointed by the Chancellor, five faculty members (two of whom shall be from the Law School) appointed by the Executive Committee of the Academic Council, and two student members from each of the communities (except in the case of the undergraduate community where there should be four members) elected by each community's Judicial Board. The Chairman of the Board shall select five-person panels consisting of a Chairman and an equal number of students and faculty. Cases referred to the board shall be assigned to the

panels in rotation, provided that a member of a panel may, at his/her request, be excused from sitting on a case by the Chairman of the Board, who may appoint a substitute from among the other members of the board. Each panel shall be known as a "Hearing Committee of the University Judicial Board."

2.030 Terms of Members

Faculty members shall normally serve for two-year terms, but are eligible for reappointment. The terms should be staggered in order to provide continuity. Two of the initial appointees shall be appointed for one-year terms. Student members shall serve for one-year terms, although they may be eligible for re-election. The board has the right to remove any member of the board for cause by a vote of a two-thirds majority of all members. The vacancy shall be filled promptly according to the original procedure.

2.040 Conduct of the Hearing

- a. The hearing will be conducted in private unless the accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Hearing Committee of the University Judicial Board will decide the issue by majority vote. If the decision is made not to hold an open hearing, the accused shall be informed in writing of the reasons for the decision.
- b. The University and the accused may be represented by an adviser of his/her choice.
- c. The board shall promulgate its own rules of procedure consistent with academic due process and all provisions of this document.
- d. The accused has the right to challenge on the grounds of prejudice any member of the Hearing Committee sitting on his/her case. If an accused makes such a challenge, the Hearing Committee shall deliberate in private to determine whether cause exists. By a majority vote of the members of the tribunal (excluding the member being challenged), a member shall be removed from the case and replaced by a member of the board designated by the Chairman of the Judicial Board. In addition, the accused may exercise a challenge directed at the entire panel, in which case the challenge shall be made to the Chairman of the University Judicial Board, who shall excuse the panel challenged and refer the accused's case to the next panel in rotation.

2.05 The Right of Appeal

- a. In cases heard by the University Judicial Board, there will be no appeal when the accused is acquitted.
- b. A student or administrator who is not a member of the faculty convicted by the University Judicial Board may appeal to the President, or in his/her absence, the Provost, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee. Argument or appeal shall be on written submission, but the President may, in addition, require oral argument.
- c. A member of the faculty convicted by the University Judicial Board may appeal to the Faculty Hearing Committee authorized under the provisions for Academic Freedom and Tenure of Duke University.

2.060 Status of the Accused

Charges must be prepared without delay following the alleged commission of the offense. Pending final verdict on charges against the accused (including appeal), his/

her status shall not be changed, nor his/her right to be on campus to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by his/her conduct, that his/her continued presence on the campus constitutes an immediate threat to the physical well-being or property of the members of the University community or the orderly functioning of the University. The imposition of interim suspension requires that the suspended individual shall immediately observe any restriction placed upon him/her by the terms of the suspension. The suspended individual shall be entitled to a hearing within three (3) days before the Hearing Committee on the formal charges. If he/she requires additional time to prepare his/her case before the Hearing Committee, he/she shall be entitled to an informal review of the decision imposing interim suspension by a three-person committee chosen from the members of the University Judicial Board by its Chairman. Interim suspension is an extraordinary remedy which will be invoked only in extreme cases where the interest of the University and members of its community require immediate action before the Hearing Committee can adjudicate formal charges against the suspended individual. If interim suspension is imposed and the accused is later found innocent, the University shall seek restitution as provided by the Hearing Committee with respect to the student's academic responsibilities incurred during the period of suspension.

2.070 Civil and Criminal Courts

Members of the University community may be subject to civil or criminal proceedings in a local court. The Chancellor may initiate legal action seeking injunctive or other civil relief, or file criminal charges when it is necessary to protect the person or property of members of the University community, or the orderly functioning or property of the University. Such action may be in addition to the filing of formal charges before the University Judicial Board and/or interim suspension.

2.080 Sanctions

- a. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon students:
 1. Expulsion. Dismissal from the University with the recommendation that the person never be readmitted.
 2. Suspension. Dismissal from the University and from participation in all University activities for a specified period of time after which the subject may apply for readmission.
 3. Suspended Suspension. Penalty (2), suspended because of unusual mitigating circumstances. In a period of time specified, conviction before the University Judicial Board, or before one of the community Judicial Boards may result in suspension.
 4. Disciplinary Probation. Placing a student on a probationary status for a specified period of time, during which conviction of any regulation may result in more serious disciplinary action.
 5. Exclusion from participation in extracurricular activities. Without limiting the generality of that penalty, such restrictions might involve participation in any collegiate athletics, or any public participation or performance in the name of the University. However, a Hearing Committee may not exclude a person from performance of the duties of an elective office, but may make such a recommendation to the appropriate organization. This penalty may be imposed by itself or in addition to any of the other enumerated penalties.

6. Censure. Written reprimand for violation of the specified regulation, including the possibility of more severe disciplinary sanction in the event of conviction for the violation of the same or one of equal seriousness within the period of time stated by the reprimand.
 7. Admonition. By an oral statement to the offender that he/she has violated the University rules or has been in contempt of the board.
 8. Restitution. Payment for all, or a portion of property damage caused during the commission of an offense. This penalty may be imposed by itself, or in addition to any of the other penalties.
 9. Fines. Payment of reasonable sums to be determined by a Hearing Committee. This penalty may be imposed by itself, or in addition to any of the other penalties.
 10. Exclusion from social activities where the nature of the violation so indicates including, but not limited to, curfews or other revocation of upperclass privileges.
- b. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon faculty members and administrative personnel not subject to the provisions of the *Personnel Policy Handbook*.
1. Dismissal. Dismissal or termination of appointment.
 2. Censure.
 3. Admonition.
 4. Restitution.
 5. Fines.

2.085 Other Powers

The Hearing Committee may recommend to the University that it seek restitution with respect to the accused's University responsibilities incurred during a period of suspension or during the period when a hearing has been conducted or shall make such other nonpunitive recommendations with respect to the accused as it shall deem appropriate.

2.090 Records

The board shall promptly arrange a policy of keeping its own records, subject to the University policy on confidentiality.

2.095 Excusal of Members of the University Community from University Obligations

Any member of the University community whose presence is required at a hearing shall be excused from the performance of any University responsibilities which would normally be performed at the time when his/her presence is required before the Hearing Committee.

2.096 Revocation of Probation or Suspended Suspension

In the event that a student has been placed on suspended suspension or disciplinary probation by the University Judicial Board and subsequently is convicted of a violation of a regulation by any other University tribunal, the suspension of his/her probation or the revocation of his/her probation will not automatically occur. In such a case the student shall be entitled to a hearing being limited to the issue of whether his/her probation should be revoked or whether he/she should be suspended as the result of the original conviction and the conduct which gave rise to the second conviction.

Article III: Community Judicial Boards

3.010 Community Judicial Boards

There shall be an undergraduate community consisting of the undergraduates in Trinity College of Arts and Sciences and the School of Engineering; a Divinity School community consisting of all students in the School of Divinity; a Law School community consisting of all students in the School of Law; a Medical School community consisting of all students in the School of Medicine; an Allied Health community consisting of all degree and certificate (i.e., paramedical, nondegree) students in the School of Allied Health; a Forestry and Environmental Studies School community consisting of all students in the School of Forestry and Environmental Studies; and a Graduate School community consisting of all students in the Graduate School. Except as hereafter provided for the undergraduate community, each community shall have such judicial system as its governing body may provide.

Article IV: The Undergraduate Community

4.010 The Undergraduate Judicial Board

A (1) *Board Established.*

There is established an Undergraduate Judicial Board, hereinafter denoted as the board.

A (2) *Membership.*

The board shall have twenty-five (25) members. Twelve (12) will be from among the undergraduates, nine (9) will be from among the faculty, and four (4) will be from among the deans in the undergraduate schools and college.

A (3) *Selection of Undergraduate Members.*

Student members of the board will be chosen from among interested rising juniors and seniors as follows:

- a. Interested candidates will apply for positions by completing written forms devised by the board.
- b. The candidates will subsequently take an objective-type written questionnaire on the several aspects of the undergraduate judicial system.
- c. Those obtaining a passing score, as defined by the board, are deemed eligible for interviews.
- d. Interviews will be conducted by senior student members of the board and one representative of the Undergraduate Student Government appointed by the Chief Executive Officer of that government.
- e. From among those interviewed, one nominee shall be recommended for each vacancy together with a total of three (3) alternates.
- f. All those nominated are subject to approval by the legislature of the Undergraduate Student Government as advised by a representative of the board in attendance.
- g. At every stage of this process, consideration shall be given to the appointment of at least one student from each of the undergraduate school and college.
- h. Except that interim members as provided for in A(6) who have served for at least one (1) semester during their junior year will become regular members of the board for the following academic year as a matter of course.

A (4) *Selection of Faculty Members.* Faculty members of the board will be appointed by the duly empowered committee of the Undergraduate Faculty Council of

Arts and Sciences through the Dean of Trinity College and Dean of Arts and Sciences and by the Dean of the School of Engineering. Coordination and the number of appointments from each school or college will be made through the Deans' Council (Deans of the two [2] undergraduate entities).

- A (5) *Selection of the Dean Members.* Dean members will be appointed by the Deans' Council (Deans of the two [2] undergraduate entities). Appointees will be deans in the undergraduate school and college, but will not include either the Dean for Student Life, the Dean for Residential Life or the Vice-President for Student Affairs, including their assistants.
- A (6) *Selection of Interim Members.*
- a. Interim undergraduate vacancies on the board are to be filled through nomination(s) of one or more of the previously designated alternates by a concurrent vote of two-thirds (2/3) of the full board membership and subsequent approval by the legislature of the student government.
 - b. Interim faculty vacancies are to be filled by the duly empowered committee of the Undergraduate Faculty Council of Arts and Sciences, and interim dean vacancies by the Deans' Council.
 - c. Any undergraduate member of the board who takes a leave of absence while remaining in good standing in the University will resume, upon return, the place previously vacated on the board.
 - d. Interim members will serve only to the end of the regular academic year whereupon the position held will be vacated and filled in the manner prescribed in A(3) through A(5).
 - e. But interim members serving during leaves of absence of regular members will terminate their duties and return to their former status as alternates upon return to service of that regular member.
- A (7) *Removal of Members.* The board may remove any member for cause by a two-thirds (2/3) majority of the full board. The vacancy so created will be filled forthwith in the manner prescribed in A(6).
- B (1) *Terms of Undergraduate Members.* Undergraduate members of the board will ordinarily serve during good behavior for terms not exceeding two years.
- B (2) *Terms of Faculty and Dean Members.* Faculty and dean members will serve two-year terms, subject to reappointment upon consent. To insure staggered terms, they may be appointed for a single year.
- C (1) *Board Organization:* The full board will elect, by majority vote, a Chairman and Vice-Chairman, both of whom must be undergraduates.
- C (2) *Board Calendar.*
- a. *Regular Terms.* The board or parts thereof will ordinarily hear and dispose of all pending cases in which charges have been preferred, during the regular fall and spring semesters, and following the end of spring semester.
 - b. *Summer Session Terms.*
 - 1. The Chairman will ascertain the local availability of board members for summer session service and those within a 200 mile radius who may be invited by the Dean for Student Life to serve at University expense.

2. The Chairs of the Undergraduate, Residential, and IFC Judicial Boards will provide the Dean for Student Life with a roster of their respective board members available for service on the Undergraduate Judicial Board during all or any portion of the summer sessions.
3. The Dean for Student Life will constitute a five (5) member Hearing Committee from this list, appoint a chairman and provide an ordinary hearing committee including at least one (1) faculty member and two (2) students.
4. If the number of student members drawn from the rosters provided under C(2)(b.)(2) above is insufficient to constitute the hearing panel provided for in C(2)(b.)(3) above, the Dean for Student Life, with consent of the Chief Executive Officer of the Undergraduate Student Government, will appoint the necessary number of students drawn from the undergraduate student body.
5. The Summer Session Hearing Committee will function in the same manner and with the same procedure as a Regular Term Hearing Committee, except that the accused may not enjoy more than one (1) peremptory challenge.

C (3) *Duties of Officers.*

- a. The Chairman, if present will preside over any meeting of the board or any meeting or hearing of a part thereof.
- b. The Chairman will maintain a roster of available members for the regular and summer session terms (see C[2]).
- c. The Chairman and the Dean for Student Life will prepare a "Semester Report of the Undergraduate Judicial Board" to be issued in January and May. It will be a statistical survey designed to order cases: by volume, classification, disposition, and current status (e.g., filed, pending, heard, on appeal to Dean or to Vice-President).
- d. The Chairman will be responsible for issuance of an "Annual Report of the Undergraduate Judicial Board" to be compiled following adjournment of the board at the end of the spring semester. The contents will contain:
 1. A listing, by types of cases, of abstracts of all completely adjudicated cases.
 2. A statistical survey of the business of the board during the preceeding academic year.
 3. A commentary on that business.
 4. Any recommendations which the board wishes to make.
 5. The "Annual Report" will be released prior to freshman registration in the fall semester and will constitute the basis of an early fall semester interview with the *Chronicle* to be held by the Chairman.

D (1) *Hearing Panel Organization.* Hearing panels will consist of seven (7) members as assigned by the Dean for Student Life in consultation with the Chairman or Vice-Chairman. Each hearing panel will consist of four (4) undergraduates, two (2) faculty members, and one (1) dean. One student member will be designated as Chairman of the panel.

D (2) *Modified Hearing Panel Organization.* In the interest of speedy disposition and with agreement of the accused, a panel of reduced size may be convened,

but in no panel shall it consist of fewer than five (5) members appointed by the Dean for Student Life in consultation with the Chairman or Vice-Chairman. Each such panel will consist of three (3) undergraduates, one (1) faculty member, and one (1) dean.

D (3) *Substitution of Hearing Panel Members.* Any member of a panel may, at his or her request, be excluded by the Chairman of the Board from sitting on any case. The Chairman of the Board will thereupon appoint a substitute member from among the relevant class of members of the board.

E (1) *Jurisdiction.* The board will exercise original jurisdiction over all cases:

- a. in which the accused is a named student in the undergraduate community defined as persons, including employees, currently enrolled in, not yet formally graduated from, or admitted and not yet matriculated or readmitted, and not yet matriculated to programs of the undergraduate colleges.
- b. which fall without the jurisdiction of the University Judicial Board and the Residential Judicial Board.
- c. which fall within the classification of offenses stipulated in the Judicial Code of the Undergraduate Community (see pp. 38–40) and the University Regulations and Policies (see pp. 42–55) in this bulletin.

F *Functions of Dean for Student Life*

F (1) The Dean for Student Life or designee is responsible for receiving complaints, conducting investigations, gathering evidence, and preparing and preferring charges relating to offenses within the jurisdiction of the board.

F (2) The Dean for Student Life may appoint assistants, in such numbers and for such duties under his/her supervision in order to faithfully execute his/her responsibilities, as the Dean shall deem convenient and useful.

F (3) The Dean for Student Life is responsible for maintenance of the records of the board. These records include:

1. a public permanent precedent file provided by panels. It consists of abstracts specifying charges, facts, case dispositions and rationales for such dispositions. Identification of the party or parties as well as of witnesses will be omitted.
2. a permanent confidential case file.

F (4) The Dean for Student Life, jointly with the board, is responsible for recruitment, training, supervision, and direction of a staff of advisers available to accused students.

G *Prehearing Procedures.* Upon receipt of a complaint, the Dean for Student Life or duly appointed assistants will:

G (1) promptly assemble and examine all evidence either material or relevant to the allegation in which task the Dean or the Dean's assistant shall enjoy prompt and full cooperation from all parties concerned. This investigatory process may include, but is not confined to:

- a. receipt of any oral and/or written evidence including documents and records.
- b. interviewing the accused which interview must begin with notification by the Dean or assistant of: a right to remain silent, a right to an adviser

as defined herein, a right to waive knowingly one or both of these rights as well as a written and signed acknowledgment by the accused attesting to an understanding of these rights (Cf. I(8)(a)).

- c. interviewing any holder of evidence.
 - d. receipt from the accused of a written statement submitted in his or her behalf which document will become part of the case record.
- G (2) promptly determine on the basis of the preliminary investigation whether or not there exists probable cause for believing that the accused person committed the alleged act(s).
- G (3) The Dean for Student Life is responsible for finding of probable cause. In determining whether to prefer charges against any accused, the Dean will consider:
- a. *civil proceedings completed.* If, in the judgment of the Dean for Student Life, any civil or criminal liability the accused may have already incurred by reason of the action of any civil tribunal adequately vindicates the interest of the University in punishment of the accused, the Dean shall not prefer charges against the accused. The Dean shall, however, report to the Judicial Board finding of probable cause and reasons for not preferring any charge.
 - b. *civil proceedings pending.* If any civil or criminal action is pending in any civil tribunal, and in the judgment of the Dean for Student Life, prompt trial before the Judicial Board would be prejudicial and unreasonably burdensome to the accused in respect to the civil tribunal proceedings, notwithstanding the finding of probable cause, the Dean for Student Life may defer preferring any charge. In making this determination, the Dean will consider the nature of the offense, the nature of the defense that may be offered in either the civil or University proceeding, the punishment that may be visited on the accused in either proceeding, the likely delay in the civil proceedings, any possible impairment of the accused's ability to defend him/herself in either proceeding by reason of its contemporaneous pendency and the preservation of general peace and order within the University community. If, after a finding of probable cause, the Dean for Student Life decided either to defer preferring charges or definitely to abandon them in the situations covered by this paragraph, the Dean shall nevertheless report to the Judicial Board his/her findings of probable cause and reasons for deferring or abandoning the preferring of charges.
 - c. *civil proceedings in future.* If any civil or criminal action is threatened or likely, the Dean for Student Life will be governed by the same considerations set forth in paragraph (b.), and in addition by the degree of likelihood of civil or criminal proceedings against the accused. If, after a finding of probable cause, the Dean for Student Life decided either to defer preferring charges or definitely to abandon them, in the situations covered by this paragraph, the Dean shall nevertheless report to the Chairman of the Judicial Board the finding of probable cause and reasons for deferring or abandoning the preferring of charges.
- G (4) In circumstances so warranting under G (3) a.-c. the sanction of interim suspension may be invoked. (See K (13)).
- G (5) *Referral.*

- a. The Dean for Student Life may refer the case to the appropriate agency for resolution if that officer finds that the case, whether or not probable cause exists, falls without the board's jurisdiction.
- b. At any time prior to imposition of verdict and sanction, any member of a panel may object to further consideration of the case on grounds that the board lacks jurisdiction. Thereupon the panel must resolve the jurisdictional question raised. If a panel majority believes the board lacks jurisdiction over the case, the proceedings will be suspended, and the matter referred to the Chairman of the Board for subsequent resolution of the question by the full Undergraduate Judicial Board. The decision of a majority of those board members present will be final, and the case will be either retained by the board accompanied by referral back to the original panel or be referred to the appropriate agency for disposition.

G (6) *Terminate action and report this fact if:*

- a. no probable cause is found.
- b. after examination of the Undergraduate Judicial Code and the University Regulations, it is determined that commission of the alleged act does not violate any provision(s) found in the duly promulgated codes, rules, and regulations of the University.
- c. in the event that the Dean for Student Life should refuse or fail for any reason to receive complaints and/or conduct investigations, and/or find probable cause and/or prefer charges, an aggrieved party may appeal such action or inaction on grounds of new or different evidence previously unavailable. This step may be made by filing with the Chairman of the Board a typed petition entitled: "Petition to Find Probable Cause." Upon receipt of this petition, the Chairman of the Board will direct the Dean or will unilaterally appoint an investigator to find facts on the basis of which a full seven (7)-member hearing panel may determine the existence of probable cause sufficient to warrant a regular hearing in due course.

G (7) *Probable Cause Notice: Regular Hearings.* If probable cause is determined to exist, the Dean for Student Life will promptly draw up a written notice to be transmitted to the accused together with a summons to appear for a panel hearing at the time and place specified. The notice will include:

- a. the charges.
- b. text of the relevant provision(s) of the Judicial Code, rules, and regulations.
- c. report of the Dean for Student Life prepared pursuant to G (9).
- d. a statement of procedural rights available to the accused.
- e. any other material which the board may instruct the Dean for Student Life to supply the accused.
- f. the signature of the Dean for Student Life or appointed assistants.
- g. list of members of the panel designated to hear the case.

G (8) *Probable Cause Notice: Administrative Alternative.* Should the Dean for Student Life, after consulting with the Chairman of the Undergraduate Judicial Board, determine that either the nature or related extenuating circumstances of a case render it amenable to the administrative hearings alternative provided for in H(1)9(b.), a written notice will include explicit notice of the availability

of such forum to an accused who within seven (7) days of receipt of the notice admits guilt to all specified charges and who signs a waiver of the right to a formal hearing before the Undergraduate Judicial Board.

- G (9) Prepare a written report of findings and transmit that report to the appropriate tribunal. This report will contain a copy of the probable cause notice (G (8)), all evidence gathered in the preliminary investigations, with its sources and statement of the rights of the accused. Nowhere in this report will a personal opinion be expressed as to the merits of any evidence, or as to the guilt or innocence of the accused. However, where there are conflicts in the evidence the Dean will draw the attention of the panel to them. The report shall become a part of the written record of the hearing.

- G (10) Subpoena witnesses as directed by the Chairman of the hearing panel.

H (1) *Administrative Hearing Alternatives.*

- a. An accused may request that his or her case be heard by the appropriate Dean of his or her college or school, who may refuse to hear it. If, after consulting with the Chairman of the Undergraduate Judicial Board, the Dean decides to hear the case that officer is bound by the same procedures followed by the Undergraduate Judicial Board and by the penalties specified in Section K of this code.
- b. The Dean for Student Life and/or that officer's appointee or appointees will confer at the earliest convenient time with an accused who has opted for and met the requirements specified in G(8). In fixing the sanction, the Dean or appointee is governed by the penalties enumerated in Section K of the code.
- c. The Chairman of the Board will receive prompt notification of hearings held under *a.* and *b.* above and a copy of the case abstract as defined in J(14)(b.).

I *Prehearing Procedures.*

I (1) *Charge required.*

- a. No case may be heard by the board in the absence of a finding of probable cause by the Dean for Student Life and a clear statement of the charges against the accused or by direct petition to the board. (Cf. G(7) and G(6)c).
- b. The Dean's signature on the Probable Cause Notice (G (8)) attests to a sufficiency of inculpatory evidence, existence of the board's jurisdiction, and the completeness of the charges.

- I (2) *Hearing Schedules.* The hearing, based on contents of the Probable Cause Notice (G (8)) will take place speedily, ordinarily within thirty (30) days following presentation of charges to and signed acknowledgment of their receipt by the accused.

- I (3) *Notice.* The accused will be given at least seventy-two (72) hours notice prior to the hearing or prior to continuation of a hearing recessed under J(8) subject to waiver as provided for in I(4).

- I (4) *Waiver.* The accused may waive by a signed written statement the notice and/or the seventy-two (72) hour rule with reference to I(3) above and I(11)b) below.

- I (5) *Continuances.* Should the accused desire additional time to prepare his or her defense, a petition to that effect may be directed to the Chairman of the Board

not less than twenty-four (24) hours prior to the scheduled hearing. In the Chairman's discretion, the accused may be granted a hearing delay of reasonable duration.

- I (6) *Contempt*. A willful or deliberate action on the part of the accused to impede, obstruct, unduly delay, or interfere at any stage with, in any manner, the proceedings then or thereafter before or potentially before the board may be deemed an act or acts in contempt of the board as determined by a majority of the relevant panel after issuance of a "show cause" order and in a separate regular proceeding held notwithstanding failure of the accused to appear in defense. K(12).

I (7) *Removal and Challenges*.

- a. *Voluntary Removal*. Board members may excuse themselves from a hearing panel for any reason (see D(3)).
- b. *Recusal*. No person presenting evidence against the accused may at any time sit in judgement upon the accused.
- c. *Challenges*.

1. *For Cause*. The accused has the right to challenge on the grounds of prejudice any member of the hearing panel sitting on his/her case. If an accused makes such a challenge, the panel shall deliberate in private to determine whether cause exists. By majority vote of the members of the panel (excluding the member being challenged), a member shall be removed from the case, and replaced by a member of the board designated by the Chairman of the Board.

2. *Peremptory*.

- a. In addition, the accused may exercise a peremptory challenge directed at not more than seven (7) panel members even if a new trial on an amended charge is required. (Cf J(8)d).
- b. At the time the accused is informed of the hearing date, he/she shall be presented with a list of the members of the Undergraduate Judicial Board and of the members of the panel designated to hear the case.
- c. If the accused wishes to make a peremptory challenge(s), he/she shall make the challenge(s) in writing to the Office of the Dean for Student Life within forty-eight (48) hours of the notification of the scheduled time of the hearing.
- d. The Office of the Dean for Student Life will transmit this challenge to the Chairman of the Board, who will excuse the panel challenged, and refer the accused to the next panel in rotation.
- e. The accused retains the right to challenge for cause whether or not he or she has used the seven (7) peremptory challenges except as noted in C(2)b and C(5).

I (8) *Adviser*

- a. *Right to Adviser*. The accused enjoys the right to have an adviser. The Dean for Student Life will assign the accused an adviser at notification of the investigation. The accused may decline the assigned adviser and may select any other member of the University community except members of the board, or the accused may select no one. (G(1)b).

- b. The function of the adviser is to advise the accused in the preparation and presentation of his or her case, but the adviser may not directly address the panel nor any other participants during the formal hearing proceedings.
- c. Witness or witnesses as defined in I(10)a may request the panel chairman to permit the presence of adviser during hearing proceedings under conditions enumerated in I(8)a and b.

I (9) *Role of Accused.*

- a. *Presentation of Case.* The accused enjoys the right and will be advised of the right to produce witnesses (including no more than two character witnesses), introduce documents, and offer testimony in his or her own behalf.
- b. *Testimonial Rights.*
 - 1. The accused enjoys the right against self-incrimination, the right to remain silent respecting the charges brought against him/her, before, during, and after the hearing. No inference of guilt may be drawn from the silence.
 - 2. But any evidence pertinent to the charges volunteered by the accused may be used as evidence against him/her.
 - 3. If the accused elects to offer testimony on a specific act of misconduct, he/she waives a right to continued silence, and must answer truthfully all questions pertaining to the act.
- c. *Examination of Witnesses.*
 - 1. Under the supervision of the panel chairman, the accused may question directly any witness.
 - 2. The moving party or the accused, with or without the adviser's assistance, may submit questions in writing to the chairman of the hearing panel or during the proceedings.
 - 3. The chairman must ask such question(s) so submitted unless they are unfair and/or irrelevant and/or purely capricious.
 - 4. A copy of the written questions will be appended to the record.

I (10) *Witnesses.*

- a. *Defined:* Any person with direct knowledge relevant to a case pending before the board is a material witness.
- b. *Duty to Appear.* The Dean for Student Life may require the appearance of material witnesses or, upon the written request of the complainant and/or the accused, the Dean will require the appearance of such witnesses.
- c. *Notice to.* The Dean for Student Life will notify such witness(es) in writing of the time, place, and purpose of their appearance as well as of the right against self-incrimination.
- d. *Contempt of.* Willful and deliberate failure and/or refusal of any material witness to honor a subpoena authorized by the board and duly served by the Dean for Student Life or a representative may be deemed an act in contempt of the board.

I (11) *Discovery.*

- a. No extrinsic evidence. In reaching its judgment, a panel will consider only the report of the Dean for Student Life, documents submitted into evidence, and the testimony of: moving party(ies), accused, and witnesses at the hearing.
- b. The accused has the right to examine the written statement of any witness which is relevant to the case at least seventy-two (72) hours prior to either the hearing or continuation of a hearing recessed under J(8) subject to waiver as provided for in I(4).
- c. *Confrontation*. The accused has the right to confront any witness who has given a statement relevant to the pending case.
- d. *Excuse priority*. Any student whose presence is required at a hearing will be excused from any other University responsibility which might prevent, impair, or delay his/her presence before a panel, and both the board and the Dean for Student Life will employ their good offices to assist such students in making satisfactory arrangements.

I (12) *Closed Hearings*. The hearing will be closed unless the accused requests an open hearing. If any objection to an open hearing is lodged, the panel will decide the issue by majority vote and, if negative, the accused will receive from the panel a written statement of reasons for rejection of his/her request.

J *Hearing Procedure.*

J (1) *Opening*. The Chairman will open the proceedings by noting the date, identity of the party(ies), the charges, and identity of all panel members.

J (2) *Plea*. The accused will then plead guilty, not guilty, guilty in part and not guilty in part, or move to postpone the hearing for good cause shown.

J (3) *Report of the Moving Party*. The Chairman will call for a reading of the report on the case compiled and transmitted by the Dean for Student Life. At this time, the Chairman may invite the moving party(ies) to make a statement, not to exceed five (5) minutes, summarizing the essential facts and expressing opinions thereon. At any point prior to this stage of the hearing, the moving party(ies) may decline such invitation.

J (4) *Case for Accused*. The Chairman of the panel will request the accused to present his or her case. (See I(7)c(1) and I(7)c(2), I(8)b, I(9).) The accused may waive this right by a verbal declaration (See I(9)b.)

J (5) *Witnesses*.

- a. All witnesses other than character witnesses, will be sequestered at the commencement of proceedings, and will appear before the panel consecutively. But the panel Chairman may suspend this rule and direct attendance of all witnesses in the hearing room providing that the accused consents to this procedure.

- b. Character witnesses are called first and excused by the Chairman following their testimony.

- c. The accused may call and direct questions to witnesses as prescribed in I(9)a and c, respectively.

- d. The panel may call and question witnesses.

J (6) *Examination of Witnesses*.

- a. Under the supervision of the panel chairman, the accused may question directly any witness.

- b. The moving party or the accused, with or without the adviser's assistance, may submit questions in writing to the Chairman of the hearing panel before or during the proceedings.
- c. The Chairman must ask such question(s) so submitted unless they are unfair and/or irrelevant and/or purely capricious.
- d. A copy of the written questions will be appended to the record.

J (7) *Evidentiary Rules.*

- a. All evidence which the panel considers relevant will be admitted including hearsay and expressions of opinion.
- b. Wherever possible oral testimony rather than written statements should be presented.
- c. Statements made by unidentified witnesses or those absent at the hearings, neither of which can be confronted by the accused, may not constitute a sole or substantial basis for conviction.
- d. No evidence obtained through unlawful search and seizure or in violation of the *University Statement on the Privacy of Students' Rooms* will be admissible at the hearing.

J (8) *Recess and Termination of Hearings.*

- a. The Chairman may recess hearings for a short duration of time in order to facilitate the work of the panel.
- b. By vote of a majority of the panel members, hearings may be recessed for an extended duration of time in order:
 - 1. to accommodate extraordinary circumstances such as personal emergencies
 - 2. to acquire additional evidence or testimony
 - 3. to provide adequate time for considering and setting sanctions (see: I(3) and I(11)b.)
- c. A witness or accused enjoys the right to a brief recess after a lapse of one (1) hour from commencement of the official record as provided for in J(14)a.
- d. However, no recess may be declared for the purpose of amending the original charges against the accused. If it is determined during the hearing and prior to verdict and judgment that the charges must be amended, the hearing must be terminated without prejudice and the procedures set forth in Section I reinstituted.

J (9) *Status of Accused Pending Verdict and Appeal (Interim Suspension).*

Pending verdict on charges (including appeal) against the accused, the status as a student cannot be changed, nor the right to be on campus or to attend classes suspended, except as provided for by the interim suspension rule (K(13)).

J (10) *Verdict and Sanction.*

- a. After the hearing closes, the panel will consider its verdict and sanction in closed session.
- b. The verdict is a determination of guilt or innocence. A guilty verdict is based on the existence of clear and convincing evidence that the accused committed the act(s) alleged in the charge.

- c. The sanction is a statement of the punishment imposed drawn from those enumerated in Section K below.
- d. Verdict and sanction will be determined by a majority vote of a panel except that any judgment of expulsion (see K(1)) or suspension (see K(2)) must be concurred in by not less than four (4) members of a five (5) member panel nor less than five (5) members of a seven (7) member panel.

J (11) *Special Master*. At any stage in the proceedings, involving complicated technical or professional subject matter, and at the request of any party or any or all members of a panel, a special master may be appointed by the Chairman of the Board in consultation with the appropriate dean. The special master will render advice to the panel. On the motion of any party or any member of the panel, proceedings may be recessed pending the receipt of the special master's report.

J (12) *Rehearing*. A panel by a majority vote may decide to rehear a case in which significant new evidence can be introduced in behalf of the accused.

J (13) *Notification of Verdict and Sanction*.

- a. The Chairman of the panel will promptly inform in writing the Dean for Student Life of the decision of the panel, but initial notification may be oral followed by the written abstract as required by J(14)b.
- b. The Chairman of the panel or the Dean shall promptly notify the defendant of the verdict and sanction imposed, and shall, at the same time, inform him or her of rights of appeal.
- c. At the request of the moving party(ies), the Dean for Student Life may, but is not required to, inform that person or persons of the panel's verdict and/or sanction.

J (14) *Record*:

- a. Tapes: A separate tape recording will be made for each hearing, clearly labelled, and retained for three (3) years.
- b. Abstract: A written abstract of each case will be made by completion of a "Hearing Committee Report Form" signed by the panel chairman.

K *Sanctions*. The board is empowered to impose singly or in combination penalties of four (4) classes.

CLASS I

K (1) *Expulsion*. Dismissal and permanent removal from the University without possibility of readmission. University censure automatically applies.

K (2) *Suspension*.

- a. Under the voting rules set forth in J(9)d, dismissal from membership in the University for a specified period of time, ordinarily including the current semester and the next succeeding one, and such additional semesters as deemed appropriate by the panel.
- b. Readmission as a student in good standing is contingent upon satisfaction of any conditions stated in the original sanction.
- c. Upon reacceptance to and matriculation in the University the student is placed on disciplinary probation K(4) for a specified period of time.

- d. As suspension constitutes an involuntary withdrawal from the University an entry to that effect is made on the student's permanent academic record for the duration of suspension.
 - e. University censure (class II) may be applied as determined by the panel.
- K (3) *Suspended Suspension.*
- a. For a specified period of time, the penalty of suspension is imposed, but suspended due to the existence of facts deemed mitigating by a panel.
 - b. A disciplinary probation period must run concurrently and may run consecutively with suspension.
 - c. As no involuntary withdrawal actually occurs, no temporary entry to that effect is made on the student's permanent record.
- K (4) *Probation.*
- a. *Disciplinary Probation.* Placing the student on a probationary status for violation of any regulation may result in suspension if adjudged guilty of subsequent infraction.
 - b. *Revocation of Disciplinary Probation.* In the event that a student has been placed on disciplinary probation by the Undergraduate Judicial Board and subsequently is convicted of violation of a regulation by the University Judicial Board, the revocation of his or her probation will not automatically occur. In such a case he or she shall be entitled to a hearing before a panel of the Undergraduate Judicial Board, said hearing being limited to the issue of whether his or her probation should be revoked as the result of the original conviction and the conduct which gave rise to a second conviction.
- K (5) *Exclusion.*
- a. from public participation or performance in the name of the University other than performance of duties as an elective officer.
 - b. from application for, retention of, or any other possession of a University housing license.
 - c. from access to, use of, and occupation of specified University-owned premise and/or facilities.
 - d. from application for, retention of, or any other possession of a traffic and parking permit.
 - e. from application for, retention of, or any other possession of IM privileges.
- K (6)* *Warning.* A formal written admonition but which explicitly states the certainty of more severe disciplinary sanction for conviction of a subsequent violation during a stated period. A warning may be entered on the student's Dean's card citizenship record at the discretion of a panel.
- K (7) *Restitution.* Payment for all or a portion of injury or damages to person(s) or property caused by commission of an offense.
- K (8)† *Fine.* Payment to Duke University of a reasonable sum of money set by a panel which may also impose a community service sanction as provided for in K(9)a or b below.

*1982 revision.

†1983 revision of substance.

- K (9) *Community Service*. Specified hours of service set by a panel during which period a student will perform as either
- a regular employee in the University student labor pool, or
 - a "volunteer" worker in a charitable enterprise in Durham city or county as arranged for and supervised by the Dean for Student Life.

CLASS II

- K (11) *University Censure*.
- Official entry on a student's permanent record, of serious misconduct including both the fact of the censure and the exact nature and circumstances of the offense.
 - This sanction is never applied unless in combination with serious offenses meriting imposition of sanction K(1)-(2). Censure indicates the seriousness of the offense and the absence of mitigating circumstances.
 - Application of this sanction requires a separate vote of a panel under J(10)d unless accompanying Expulsion K I(l).

CLASS III

- K (12) *Contempt*. Exclusion from registration, enrollment, or matriculation at the next ensuing semester, including semesters of summer session or eligibility to graduate from Duke University pending relief from verdict and sanction by compliance in good faith with the original order, directive or subpoena. This penalty is ordinarily used in contempt proceedings described in I(6) and I(10)d.

- K (13) *Interim Suspension*.

- An extraordinary remedy invoked only in extreme cases requiring immediate action prior to a panel hearing.
- If the Dean for Student Life deems any student's presence on campus, at any time to constitute a threat to the general peace and order of the University community and to its several members that officer may so notify the Provost or Chancellor, who may, in his or her discretion, suspend the named student from the University for a three (3)-day period pending a hearing before a duly constituted panel of the board.
- If the student or board requires a continuance the interim suspension may be extended by the Provost or Chancellor or by a duly constituted panel of the board.
- If interim suspension is imposed and the accused is later found innocent, the University will grant restitution as provided by the Undergraduate Judicial Board with respect to that student's academic responsibilities incurred during the period of suspension.

- K (14) *Temporary Restraining Order*.

- A formal written ex parte order issued by a duly constituted panel or the Chairman of the Board directing a named actor(s) to cease and desist from engaging in behavior deemed contrary to one or more provisions of the Undergraduate Code. (See I(6) and K(12)).
- Such TROs are of twenty-one (21) days duration but are renewable only through regular panel proceedings.

CLASS IV

- K (15)**Counseling Recommendation*. If a panel majority believes that a student would benefit from professional counseling, it may recommend such action to the Dean for Student Life who may so advise the student.
- L *Appeal*.
- L (1) *Right of Appeal*.
- a. Appellant may appeal any verdict and sanction of the board to the dean of the relevant undergraduate college or school in any case involving academic dishonesty. In all cases involving infractions other than academic dishonesty appellant may appeal the verdict and sanction of the board to the Vice-President for Student Affairs.
 - b. The dean or Vice-President may delegate further consideration of an appeal to an appropriate member of his or her staff.
- L (2) *Form and Time of Notice to Appeal*. A written statement clearly and briefly setting forth grounds for appeal must be submitted to the relevant dean, unless waived by that officer within two (2) class days after receipt of the verdict and sanction.
- L (3) *Form and Time of Actual Appeal*. A written statement clearly and briefly setting forth grounds for appeal must be submitted to the relevant dean, unless waived by the officer within seven (7) days after receipt of the verdict and sanction.
- L (4) *Exclusive Grounds for Appeal*.
- a. Procedural error substantially affecting the rights of the accused.
 - b. Incompatibility of the verdict with the evidence.
 - c. Excessive penalty not in accord with "current community standards."
 - d. New evidence of a character directly affecting the verdict but on which basis rehearing was denied by the board.
 - e. Error in applying or interpreting the rule under which the case was originally tried.
- L (5) *Appeal Procedures*.
- a. The relevant administrative officer of the University may not hear testimony *de novo*.
 - b. He/she shall receive documents submitted by the panel including tapes, abstracts, written opinions, and dissents.
 - c. The appellant may prepare for his/her defense with the assistance of an adviser and may at his/her expense make a transcription of the tape.
 - d. The appellant must submit a written statement setting forth grounds for his/her appeal as required by L(3) and the supporting arguments.
 - e. The appellant has a right to make an oral statement to the dean to amplify his/her written arguments. The administrative officer may question the defendant at this time about his/her oral statement or written statement, but shall confine himself or herself to the issues on appeal. These additional statements and arguments shall be recorded.
 - f.* Either the chairman of the relevant hearing panel or the administrative officer charged with responsibility for hearing the appeal may request a

conference between themselves to consider issues arising out of the case. A notation of such conference shall likewise be incorporated in the record.

- g. With the consent of appellant, the administrative officer may consult with such other members of the University community as he/she chooses concerning disposition of the appeal.

L (6) *Appeal to President.* The appellant may appeal an unfavorable decision of the administrative officer to the President of the University who may, in his or her discretion entertain such appeal, under such conditions and with such procedures as he or she may prescribe. The President will notify the Board Chairman of the decision.

L (7) *Notification.*

- a. In all cases the relevant administrative officer or President of the University will submit to the Chairman of the Board, with a copy to the Dean for Student Life a written statement of the decision and reasoning on which it is based.
- b. Such administrative officers will promptly communicate their decision to the appellant.
- c. At the request of the moving party(ies) the Dean for Student Life may, but is not required to inform that person or persons of the outcome of the appeal.

M *Amendment of Article IV.*

M (1)† Article IV, "The Undergraduate Judicial Board," may be amended at any time by the Vice-President for Student Affairs only on the recommendation of a permanent Advisory Committee on Judicial Codes composed of undergraduates, faculty, and deans appointed by and acting under that officer's supervision and direction.

M (2)† All amendments promulgated by the Vice-President for Student Affairs shall be effective from and after the date of promulgation.

†1983 revision of form.

Appendix D

The Residential Judicial Code

Preamble

A basic part of living in the Duke undergraduate community is every member's recognition of and maintenance of those factors which support and foster a harmonious residential life. Among them are: (1) a living situation conducive to and supportive of academic pursuits, (2) privacy, (3) maturity and responsibility of both individuals and living groups, (4) security, (5) financial responsibility, (6) individual and group freedom of life style that does not infringe upon the liberty of other individuals or living groups, (7) an atmosphere of discretion and consideration regarding personal matters.

In recognition of the responsibility of each undergraduate to adhere to these fundamental rights of all the duties of each, the University and its student-operated institutions treat every person as a mature individual. And the University accords recognized residential living groups certain privileges including: (1) priority use of a residential section, including commons room areas, (2) priority of its members with regard to room selection within the section, (3) use of University facilities, (4) loan privileges from the University, (5) the use of University purchasing channels.

In the event of conflicts arising within the undergraduate community, impartial institutions exist for their peaceful resolution with due regard for the rights, privileges, and duties of each member or several members of the Duke residential community.

Article I: The Residential Judicial System:

The Residential Judicial System includes those of the several residential units and consists of (1) such committees, councils, or boards composed of elected or appointed resident members and constituted for a single unit or for more units than one as may exist or be subsequently established to adjudicate conflicts, (2) the Interfraternity Council Judicial Board (IFCJB), and (3) the Residential Judicial Board with campus-wide adjudicatory power as defined below. The system's jurisdiction includes conflicts in "the Judicial Code of the Undergraduate Community" in this bulletin at pp. 38-40 but which fall outside the jurisdiction of the University and Undergraduate Judicial Boards as well as those related to relevant provisions of the "Care of Dormitory Rooms and Adjacent Campus Areas," "House Dues Policy," "Violation of Housing License," and "University Policies and Regulations" in this bulletin at pp. 42-55.

Article II: House Judicial Systems

- A. Each residential unit may establish a suitable organization for adjudication of intra-unit conflicts.
- B. Such organization must establish and promulgate procedures for processing its business.
- C. Any resident(s) of such unit may bring a case before the organization as established and the Dean for Residential Life may refer cases to it.
- D. The house adjudicatory organization may refer any case within their cognizance to the Dean for Residential Life for reference to the IFC, the Residential or Undergraduate Judicial Board [see M(2)(3)].
- E. The following penalties may be imposed:
 1. Censure

2. Fine
 3. Restitution
 4. Exclusion from social activities
 5. Forfeiture of room drawing priority
 6. Recommendation to the Residential Judicial Board of cancellation of room contract.
- F. Every judgment of any house adjudicatory organization will be filed with the Dean for Residential Life within 24 hours of its release. The Dean will thereafter certify that judgment as a final disposition of the case or direct, on petition of the original aggrieving party or on the Dean's own motion, that the Residential Judicial Board hear it as an appeal.
- G. If a house adjudicatory organization fails to enter a judgment in any case within twenty-one (21) calendar days after receiving it, the Dean for Residential Life may transfer that case to the Residential Judicial Board.

Article III: Upperclass Housing Association Judicial Board (UHAJB)

- A. Two or more nonfraternity upperclass residential units may establish a common organization for adjudication of conflicts: (1) between and among such residential units, (2) between and among residents thereof, and (3) between residential units and residents.
- B. The organization and procedures of the UHAJB will be analogous to those provided for the IFCJB in Article IV below.

Article IV: Interfraternity Council Judicial Board (IFCJB)

- A. Fraternity units may establish an Interfraternity Council Judicial Board with such organization and procedures as provided for in the Constitution and By-Laws of the Interfraternity Council which are consistent with the provisions of this Article.
- B. Any member of a fraternity unit may bring a case before the IFCJB and the Dean for Residential Life may refer cases to it.
- C. The IFCJB will enjoy exclusive original jurisdiction in cases which involve only (1) Fraternity units and their members, (2) Property belonging to either or both, and (3) Interests affecting either or both. Included are:
1. rush and pledge rules and regulations.
 2. "hazing" as defined in this bulletin at p. 50
 3. damage to off-campus private, real, or personal property.
 4. actions between and among fraternity residential units, between and among fraternity members, and between fraternity residential units and fraternity members.
- D. In all other cases involving fraternity residential units the board is eligible to obtain jurisdiction of a case(s) under the following procedure.
1. The Dean for Residential Life notifies in writing the Chairman of the IFCJB that one or more named fraternity residential units are parties to the case.
 2. Within three (3) class days (72 hours) of receipt of notification of the IFCJB Chairman, files with the Dean for Residential Life a petition advancing grounds for referring the case(s) to the board for adjudication in the first instance.

3. The Dean for Residential Life at his or her discretion, consistent with the "important case" criteria set forth in N(2), determines that the case(s) should be referred to the IFCJB.
- E. The following penalties may be imposed:
1. Censure
 2. Fine
 3. Restitution
 4. Community volunteer services performed under the supervision and direction of the Dean for Residential Life.
 5. Suspension or probation for a specified time period from one or more enumerated activities cosponsored, sponsored, or performed by a fraternity residential unit made as a recommendation to the Dean for Residential Life.
 6. Suspension or revocation of the privilege of a fraternity residential unit to exist at Duke University made as a recommendation to the Dean for Residential Life.
- F. Temporary restraining orders of twenty-one (21) days duration, renewable by action of the IFCJB, may be issued ex parte by that Board directing named executive officers of a fraternity residential unit(s) and/or named member(s) thereof to cease and desist from specific action within the board's jurisdiction. Noncompliance with such order constitutes contempt of the IFCJB. That board may refer the case directly to the Dean for Residential Life with a recommendation for action by Undergraduate Judicial Board.
- G. Every judgment of the IFCJB will be filed with the Dean for Residential Life within 24 hours of its release. The Dean will thereafter certify that judgment as a final disposition of the case or direct the Residential Judicial Board to hear it as provided for in Section H below.
- H. A judgment of the IFCJB may be appealed to the Residential Judicial Board by the original aggrieved party or, in exceptional circumstances, by the Dean for Residential Life.
- I. If the IFCJB fails to enter a judgment in any case within twenty-one (21) calendar days after receiving it, the Dean for Residential Life may transfer that case to the Residential Judicial Board.
- J. The IFCJB may refer any case within their cognizance to the Dean for Residential Life for reference to the Residential or Undergraduate Judicial Board [See N(2)(3)].

Article V: The Residential Judicial Board

- A. A Residential Judicial Board (RJB) is established.
- B. *Size.* The board is composed of fourteen (14) undergraduate members.
- C. *Terms.* These members will serve one (1) year terms but for not more than two (2) consecutive one (1) year terms. After two (2) consecutive one (1) year terms, incumbent members of the board may reapply for continued service on the board under procedures specified in IV(D).
- D. *Selection.* Solicitation for membership will be by public notice. Interested applicants from all classes except graduating seniors will submit written statements indicating their interest in an appointment to the board. From among these applicants, the nonreturning members of the board augmented by one (1) represen-

tative of the undergraduate student government, appointed by that government's Executive Committee, will constitute a selection committee of not less than three (3) members. The Executive Committee of the student government will appoint sufficient members of the committee to constitute at least a membership of three in the event that there exists fewer than two (2) nonreturning board members.

- E. (1) The Selection Committee may interview all, but must interview at least two (2) candidates for each vacancy on the board unless there are fewer than two (2) such candidates available. (2) In making the appointments, consideration should be given by the committee to providing a board broadly representative of the Duke undergraduate residential community.
- F. All members so selected must be duly approved by the student legislature.
- G. *Interim Vacancies.* Interim vacancies may be filled for the remainder of the academic year, by a majority vote of all members of the board.
- H. *Removal.* Removal of any member for cause requires a two-thirds majority of all board members. Such an interim vacancy must be promptly filled.
- I. *Organization.* The board will elect a Chairperson, a Vice-Chairperson, and a Secretary. The Secretary will keep permanently filed minutes of all actions of the board.
- J. *Reports.* The proceedings and decisions of the board are ordinarily confidential matters [see P(3)]. However, the board in its discretion may issue general policy statements related to a specific class or classes of a case or cases previously adjudicated *and* at least once a year or more often as determined by the board, a public statistical report must be issued on business conducted during the preceding time period.
- K. *Quorum.* Five (5) members of the board may, in its discretion, adjudicate cases involving money amounts aggregating less than \$25, by instituting publicly known procedures using fewer than five (5) members.
- L. *Voting.* Final decisions of the board are to be made by a simple majority vote. The chair may vote only in the case of a tie.
- M. *Jurisdiction.* The board has jurisdiction over all disputes arising in residential unit(s) which are not within the jurisdiction of the University Judicial Board or Undergraduate Judicial Boards [but note M(3) below]. Its jurisdiction includes:
 - 1. all appeals from judgments rendered by any house or other duly constituted judicial board provided for in Articles II, III, or IV.
 - 2. original jurisdiction in the absence of a house judicial system as defined in Article II and as set forth in N(1) below.
 - 3. violation of the Judicial Code of the undergraduate community (see this bulletin, pp. 38–40) by residential units or by other cohesive units or by unnamed members thereof.
 - 4. noise abatement. [See *Noise* 1(c)(d).]
 - 5. claims relating to damage to, destruction of, or theft of private, real or personal property located on or off the premises of Duke University.
 - 6. monetary assessments. [See “House Dues Policy” in this bulletin.]
 - 7. any of the above or other disputes affecting the general peace and order of the Duke community, not subject to Undergraduate Judicial Board jurisdiction between:

- a. different living groups
 - b. individual student(s) of different living groups
 - c. individual student(s) of one living group and a different living group(s)
 - d. an individual or group of individuals and their own living group
8. charges of contempt against any student or residential unit which has acted to impede, obstruct, delay, or otherwise interfere with the proceedings or judgment of the Residential Judicial board.

N. *Presentation and Referral of Cases.*

- 1. Any aggrieved undergraduate or group(s) of undergraduates, who or which has/have previously made reasonable and good faith efforts to resolve a dispute through utilization of other existing remedial procedures, may petition for a board hearing of an issue properly within the board's jurisdiction, either directly or through the Office of the Dean for Residential Life.
- 2. The Dean for Residential Life or a duly authorized agent/appointee may, on his/her own initiative or on the recommendation of others, including but not restricted to an aggrieved party or parties, resident advisers, faculty members, the Undergraduate Judicial Board, law enforcement officers, and officials of Duke University, present directly to the board important cases properly within its jurisdiction.
- 3. The Residential Judicial Board may refer, at any time, cases to the Dean for Residential Life with a recommendation that proceedings be initiated pursuant to the jurisdiction of the Undergraduate Judicial Board.

O. *Sanctions.* The Residential Judicial Board may impose the following sanctions:

- 1. censure
- 2. reprimand
- 3. specified or general probation for a fixed time period
- 4. restitution
- 5. fine
- 6. forfeiture of room drawing priority
- 7. cancellation:
 - (a) of room license
 - (b) of campus traffic and parking permit with or without refund of fee
- 8. suspension for a specified time period of one or more enumerated activities cosponsored, sponsored, or performed by a residential unit or units or by any other cohesive unit or units.
- 9. recommendation to the Dean for Residential Life that the privilege of a residential unit or units or of any other cohesive unit or units to exist at Duke University be suspended or revoked.
- 10. community service for specified hours set by the board during which period a student will perform as either:
 - (a) a regular employee in the University Student Labor Pool or
 - (b) a "volunteer" worker in a charitable enterprise in Durham city or county as arranged and supervised by the Dean for Residential Life

11. *ex parte* order of the board issued to any subject within the board's jurisdiction enjoining from and directing to cease and desist from continuing to cause, causing or threatening to cause any dispute(s), disorder(s), damage(s), or any other act(s) within the jurisdiction of the board [See P(8)(d)]

P. *Procedures.*

1. *Notice and Hearing.* The parties involved must receive timely written notice of the charges levied as well as the time, date, and place of the hearing and composition of the board. At the hearing, they may present evidence and confront and examine witnesses.
2. *Speedy Hearing.* The hearing of all charges shall normally take place within ten class days following the presentation of the charges to the parties involved. However, upon the written request of either party, a continuance of reasonable duration may be granted by the board for good cause.
3. *Hearings Closed.* The hearing will be conducted in private unless all parties involved in concurrence with the Residential Judicial Board request an open hearing.
4. *Right to Adviser.* Each of the parties involved may be assisted by an adviser of his/her choice from the University community. However, the adviser may address no party other than the advisee.
5. *Conflict of Interest.* No interested party may sit in judgment upon a case.
6. *Challenges.* The parties involved shall have the right to challenge on the grounds of prejudice any member of the board not less than twenty-four (24) hours prior to the scheduled hearing. The Chairman may, in his or her discretion, expeditiously grant the challenge and accordingly reconstitute the board. If the Chairman refuses or fails to act affirmatively toward the challenge or is the one actually challenged, the board shall deliberate in private to determine whether cause exists. By a majority vote of the members of the board (excluding the member against whom the challenge is made), that member shall be removed from the case, provided that the parties involved may not exercise a challenge directed at the entire Residential Judicial Board.
7. *Discovery and Evidence.*
 - (a) The party(ies) involved are entitled to examine all documents and other tangible evidence submitted in conjunction with a case at least seventy-two (72) hours prior to a hearing.
 - (b) Depositions, reports, statements, or other written material may be introduced at the hearing, but may not serve as conclusive evidence for any judgment rendered by the board.
8. *Witnesses and Others.*
 - (a) A material witness before the board is defined as a person or persons who has(have) been served with and directed by a written summons, issued by the Dean for Residential Life or by that officer's designee [see N(1)(2)], to appear before the board at a specified time and place for the purpose and who either (1) has or may have direct knowledge of a case(s) under the board's consideration or (2) is an officer of a residential or other cohesive unit against which a complaint has been lodged [e.g., under M(3)].
 - (b) In the absence of a material witness *other than* the alleged offending party(ies), the case must either be remanded to the Dean for Residential Life or dismissed.

- (c) Any person whose presence is required by the Residential Judicial Board shall be excused from any other University responsibilities which would conflict with his/her presence before the board. The appropriate dean will notify all concerned parties of the excused absence.
 - (d) Failure of any person to comply with a summons or otherwise deliberately to impede, obstruct, unduly delay or to interfere at any state with, in any manner, the proceedings of the board may be deemed an act or acts in contempt of the board if, following issuance to the contemner of a "show cause" order conforming with procedures provided in Section P(1)(2), a majority of the members present is determined. Accompanied by supporting material [see P(13)] the case of a person cited for contempt will be promptly referred by the Chairman to the Undergraduate Judicial Board in accordance with the procedure in Section N(3).
 - (e) Other persons with an interest in the proceedings and who may be affected by a decision of the board in a specific case or cases may be admitted to the proceedings and be seated as determined by the board.
9. *Right of Confrontation.* A party or parties before the board is(are) entitled to confront and ask questions of any person(s), including those specified in N(1) and N(2), qualified to be designated as material witnesses and who, for such purpose, are so designated P(8)(a).
 10. *Self Incrimination.* Anyone who appears before the board enjoys a right to avoid self incrimination.
 11. *Judgment.* In reaching its decision the board shall consider only those documents submitted into evidence and the testimony of witnesses given at the hearing.
 12. *Notification of Judgment.* In cases coming before the Residential Judicial Board, the Chairman of the Board shall promptly communicate orally the board's decision to the parties involved.
 13. *Written Decision.* Within seven (7) class days, the Chairman or his/her designee will transmit to the parties and to the Dean for Residential Life a written decision. It will contain a brief statement of the facts of the case, the board's jurisdictional basis, the judgment, and the reason(s) therefore. The Dean's copy will be retained in a permanent file.
- Q. Decisions of the Residential Judicial Board are final unless appealed to the Dean for Residential Life within nine (9) class days of the written decision. Grounds for appeal are limited to:
1. procedural error substantially affecting the rights of the parties involved.
 2. verdict not supported by the weight of the evidence.
 3. excessive penalty not in accord with "current University community standards."
 4. new evidence of a character directly affecting the verdict, but on which the original tribunal had refused a new hearing.
 5. error in applying or interpreting the rule under which the case was originally tried.
- R. *Administrative Hearing Option.*
1. With the concurrence of all parties involved, a case may be initially presented to the Dean for Residential Life who may, in his/her discretion, hear it. Or that

Dean may refuse to hear it and either refer the case to another Dean or remand the case to the Residential Judicial Board in accordance with N(1).

2. If the Dean decides to hear the case he/she is bound by the same procedures which bind the Residential Judicial Board except in procedures involving majority decisions. These decisions will be made by the Dean using his/her discretion.
3. The Dean shall have the authority to give any of the penalties specified by the code.
4. The Dean may not be subjected to a challenge, as otherwise authorized by Section P(6) above.

S. *Amendment.*

1. Amendment of the organization, jurisdiction, procedures, and sanctions in the residential judicial system may be recommended to the Vice-President for Student Affairs of the University at any time by the duly constituted Advisory Committee on Judicial Codes.
2. Such recommendation may be further considered by and subsequently promulgated by the Vice-President for Student Affairs and shall be effective from and after the date of promulgation.

Appendix E

PICKETS, PROTESTS, AND DEMONSTRATIONS

Statement of Policy. Duke University respects the right of all members of the academic community to explore and to discuss questions which interest them, to express opinions publicly and privately, and to join together to demonstrate their concern by orderly means. It is the policy of the University to protect the right of voluntary assembly, to make its facilities available for peaceful assembly, to welcome guest speakers, to protect the exercise of these rights from disruption or interference.

The University also respects the right of each member of the academic community to be free from coercion and harassment. It recognizes that academic freedom is no less dependent on ordered liberty than any other freedom, and it understands that the harassment of others is especially reprehensible in a community of scholars. The substitution of noise for speech and force for reason is a rejection and not an application of academic freedom. A determination to discourage conduct which is disruptive and disorderly does not threaten academic freedom; it is rather, a necessary condition of its very existence. Therefore, Duke University will not allow disruptive or disorderly conduct on its premises to interrupt its proper operation. Persons engaging in disruptive action or disorderly conduct shall be subject to disciplinary action, including expulsion or separation, and also charges of violations of law.

Rule. Disruptive picketing, protesting, or demonstrating on Duke University property or at any place in use for an authorized University purpose is prohibited.

Hearing and Appeal. Hearing Committees will be appointed by the Executive Committee of the Academic Council to judge initially and expeditiously all cases involving students which arise under the regulations that pertain to pickets, protests, and demonstrations. The Hearing Committees are to be regarded as a temporary arrangement subject to re-examination after the report of the Committee on Judicial Procedures is at hand.

A Hearing Committee will consist of two faculty members, one dean, and two students. These students will be selected from members of the judicial boards or govern-

ments in the undergraduate, graduate, or professional colleges or schools. The Chairman of the Hearing Committee will be designated by its members.

The Hearing Committee will conduct its proceedings in accordance with academic due process.

The decision of the Hearing Committee shall be final if the accused is exonerated or if there is no appeal. In other cases appeal may be taken to the President, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee. Argument on appeal shall be written submission, but the President may in addition require oral argument.

The procedures for faculty members will follow the arrangements provided under the *Personnel Handbook*.

Amendments. These regulations on pickets, protests, and demonstrations may be changed or amended by the University at any time but any such change or amendment shall be effective only after due notice or publication. These regulations supersede any regulations heretofore issued on the subject.

Appendix F

RULES GOVERNING DRUG VIOLATIONS

Rules governing drug violations at Duke University are as follows.

1. Alleged violations of the policy stated in the first paragraph of the drug policy on page 43 will be adjudicated by the Undergraduate Judicial Board or appropriate deans, or in the case of nonstudents, by comparable authorities and their appointed delegates. It is expected that professional judgment will be exercised in referring indicated cases to University health and counseling services in keeping with the second and third paragraphs of the policy on page 43.
2. The two grounds which may constitute occasion for the assessment of penalties are:
 - a. conviction of a member of the University on a drug charge by a court of law.
 - b. a finding with the appropriate University tribunal, in conformity with the principle of due process, of sufficient evidence that a member of the University has violated the drug policy.
3. The maximum penalty to be imposed within the University upon a student for possession or use of marijuana shall be suspension; for the possession or use of other illegal drugs, or the distribution of any illegal drug, the maximum penalty of the University is expulsion. Other members of the University shall be liable to appropriate comparable penalties.

Appendix G

DUKE UNIVERSITY REGULATIONS CONCERNING PAYMENTS OF ACCOUNTS

Basic University policy requires that tuition and mandatory fees be paid in full prior to the beginning of each semester whether an invoice has been received or not. As part of the agreement of admission to Duke University, a student is also required to pay all monthly invoices for any additional charges as presented. Two new plans commencing in June, 1985 will offer an alternative for payment of a portion of the

charges billed each year. The *Multiple Payment Plan* will provide an opportunity to pay tuition, room, and board in nine (9) installments. The *Guaranteed Tuition Plan* (freshmen only) finances and guarantees the amount and rate of tuition for four (4) years through forty-four (44) equal installments (seven [7] semesters through thirty-nine [39] installments for January freshmen) financed at 11 1/2 percent interest. If full payment or arrangement for payment through the two plans is not received, a penalty charge as described below will be assessed on the next monthly invoice and also certain restrictions as stated below will be applied.

Late Payment Penalty Charge. If the "Total Amount Due" on an invoice is not received by its due date, the next invoice will reflect a penalty charge of 1 1/4 percent per month assessed on the past due balance regardless of the number of days past due. The "Past Due Balance" is defined as the previous balance less any payments and credits received on or before the due date and also less any student loan memo credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default of this agreement if the "Total Amount Due" on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or have a diploma conferred upon graduation. In addition, an individual in default may be subject to withdrawal from school.

Appendix H

STUDENT HEALTH GRIEVANCE PROCEDURE

Purpose. This grievance procedure, designed by the Student Health Advisory Committee (SHAC), is meant to facilitate satisfactory resolution of complaints arising from services received from the Student Health Program. The individual who has such a complaint is urged to employ this mechanism rather than other, more informal modes of redress.

Procedure—Phase I. Any Duke student who feels he or she has a legitimate complaint with regard to services rendered by the Student Health Program is to obtain and complete the grievance form found in the ASDU office and the Dean for Student Life's office. This is to be returned to the Dean for Student Life within seven (7) days of the event.

One copy of the grievance form will go to the Director of Student Health and another to SHAC. After appropriate investigation, the Director of Student Health shall respond to the student in writing, with a copy of the response to SHAC. The event will be discussed by SHAC and a SHAC member will contact the student to be sure he or she is satisfied with the process and outcome. Copies of the grievance form and response will be kept on file with the Director of Student Health. Confidentiality will be maintained throughout the process, with the student's identity being protected.

Procedure—Phase II. If the student is not satisfied with the outcome of the procedure, he or she will be asked to submit a statement explaining why.

SHAC will discuss the event and respond to the student.

Procedure—Phase III. If the student is still displeased, all of the above forms (grievance form, response, Phase II letter, SHAC response) will be sent to the Vice-President for Student Affairs, and the Chairman of the Department of Community and Family Medicine.

Telephone Numbers Frequently Used

ADMISSIONS	684-3214
ASDU	684-6403
Belvin, James—Director of Undergraduate Financial Aid	684-6225
BRYAN CENTER INFORMATION DESK	684-2323
Bryan, Virginia—Assistant Dean/Natural Science/Trinity College	684-6536
Bryant, Martina—Assistant Dean/Social Science/Trinity College	684-2075
BURSAR	684-3531
Cahow, Clark—Registrar	684-3146
Coon, Susan—Director of the Office of Cultural Affairs	684-5578
COUNSELING AND PSYCHOLOGICAL SERVICES	684-5100
Cox, Richard—Dean/Residential Life	684-6313
CULTURAL AFFAIRS	684-5578
Dowell, Earl—Dean of the School of Engineering	684-2214
Eisenson, Howard—Director of Student Health	684-6721
Eldridge, Albert—Associate Dean/Trinity College	684-2115
EMERGENCY	911
ENGINEERING, SCHOOL OF	684-2214
FINANCIAL AID	684-6225
Friedrich, John—Chairman of Department of Health, Physical Education, and Recreation	684-2202
Griffith, William—Vice-President for Student Affairs	684-3737
HOUSING MANAGEMENT	684-5226
HEALTH, PHYSICAL EDUCATION, AND RECREATION	684-2202
INTERNATIONAL HOUSE	684-3585
Lattimore, Caroline—Dean/Minority Affairs	684-6756
McDowell, Homai—Director of the Office of Student Activities	684-2163
MINISTER TO THE UNIVERSITY	684-2177
MINORITY AFFAIRS	684-6756
Moorman, Jane Clark—Director of Counseling and Psychological Services	684-5100
Nathans, Elizabeth—Assistant Dean/Freshman, Trinity College	684-6217
Nijhout, Mary—Assistant Dean/Adviser for Health Professions/Trinity College	684-6903
O'Connor, Patricia—Director of Placement Services	684-3813
PAGE BOX OFFICE	684-4059
Phelps, Jake—Director of University Union	684-2911
PLACEMENT SERVICES	684-3813
PUBLIC SAFETY	684-2444
RESIDENTIAL LIFE	684-6313
Shepard, Marion—Associate Dean/Engineering	684-2214
Silver, Brian—Director of International House, International Adviser, and Assistant Dean/Trinity College	684-3585
Starnes, Marian—Bursar	684-3531
STUDENT ACTIVITIES	684-2163
STUDENT AFFAIRS	684-3737
STUDENT HEALTH	684-6721
STUDENT LIFE	684-6488
Thomason, Fidelia—Director of Housing Management	684-5226
TRINITY COLLEGE	684-3465
UNION	684-2911
Wasiolek, Suzanne—Dean/Student Life	684-6488
White, Richard—Dean of Trinity College and of Arts and Sciences	684-3465
Willimon, William—Minister to the University	684-2177
Wilson, Gerald—Assistant Dean/Social Sciences/Prelaw Advisor (Trinty College)	684-2865
Wittig, Ellen—Assistant Dean/Humanities, Trinity College	684-5585
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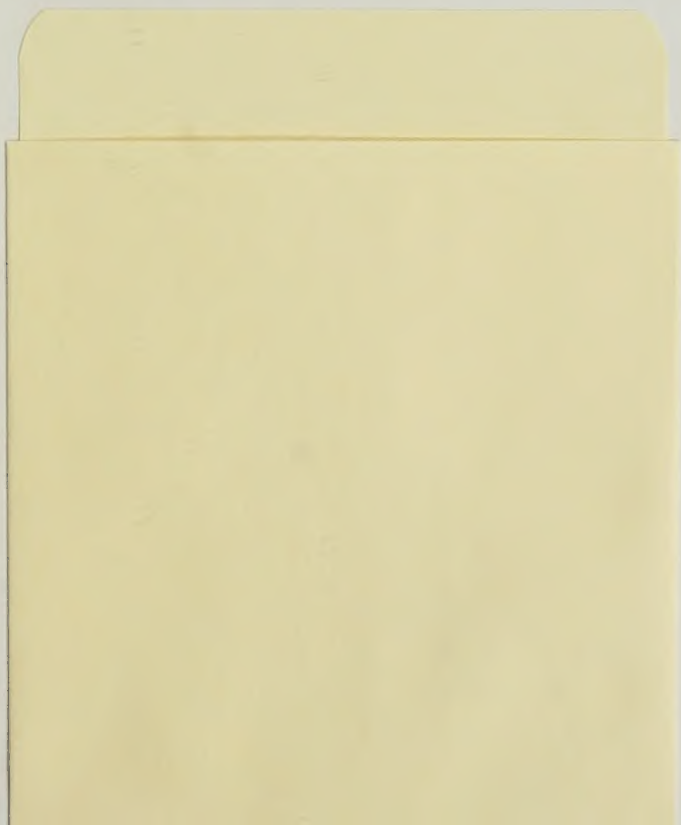
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